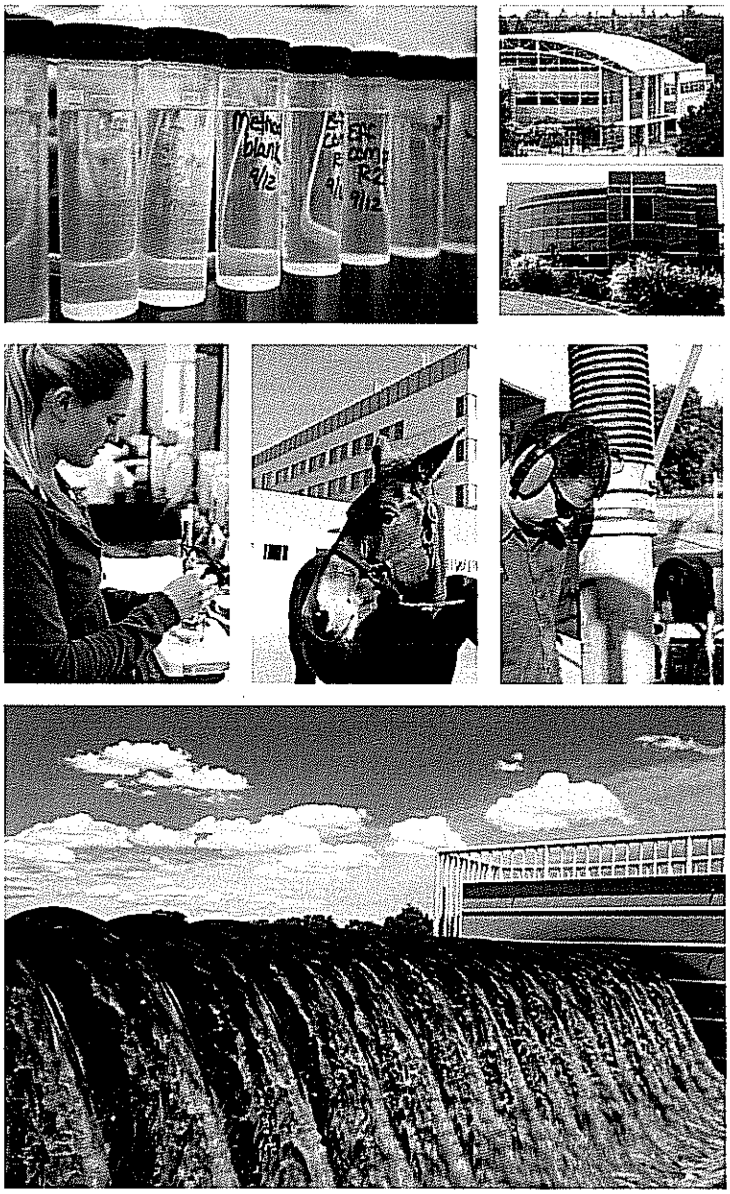
Antidegradation Analysis
for the
UC Davis Wastewater Treatment Plant Expansion Project



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1 INTRODUCTION

1.1 DISCHARGER DESCRIPTION

The University of California owns and operates a tertiary wastewater treatment plant (WWTP) located the southern portion of the main campus. The campus WWTP provides an advanced tertiary level treatment and includes channel grinders and mechanical bar screen, oxidation, filters, and UV disinfection.

The campus WWTP treats wastewater from the UC Davis campus, which has a daytime population of approximately 45,000. The WWTP is currently rated for an average dry weather flow (ADWF) of 2.7 mgd, and treats an annual average of approximately 1.8 mgd. Treated wastewater is discharged into the South Fork Putah Creek (Outfall 001) or into the Arboretum Waterway (Outfall 002). Since the Arboretum Waterway discharges into the South Fork of Putah Creek, all treated effluent from the WWTP ultimately flows into the South Fork.

Since December 2006, the campus has been working to expand the reliability and capacity of the WWTP by implementing the "Campus Wastewater Treatment Plant Expansion" project. This project entails a modular expansion of several treatment plant unit processes (e.g., a third clarifier, additional filters, etc.). The expansion was designed to meet anticipated campus wastewater treatment demands through 2013. The expansion was prompted by the occurrence of high peak flows during storm events and planned campus growth. Several times since 2000, peak influent flows have equaled or exceeded the peak design flow of 6.3 mgd. The expansion project was necessary to ensure that the University can reliably maintain permit compliance. A comprehensive Environmental Impact Report was developed for the project and subsequently certified by the University (EDAW 2004, EDAW 2005).

Following completion of the Phase I expansion, the University will be able to increase the average and peak flow rates of treated effluent discharged to Putah Creek while maintaining its historical record of permit compliance. Construction is expected to be substantially complete by January 2008. The University does not anticipate exceeding its currently permitted capacity of 2.7 mgd for several years.

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to document the antidegradation analysis performed to evaluate expansion of the campus WWTP from a permitted average dry-weather flow capacity of 2.7 mgd to 3.6 mgd. The information contained in this analysis is intended to provide the Regional Water Quality Control Board (RWQCB) with the information needed to certify that the proposed capacity increase is consistent with state and federal antidegradation policies. In June 2007, the campus WWTP submitted its NPDES permit renewal application. This report serves as additional documentation to support that application.

This antidegradation analysis follows the guidance provided by the State Water Resources Control Board (SWRCB) regarding the implementation of the antidegradation policy in NPDES permits APU 90-004 (SWRCB 1990). Pursuant to the guidelines, this analysis follows the provisions for a 'complete analysis' and evaluates whether changes in water quality resulting from the proposed capacity increase are 'consistent with maximum benefit to the people of the state, will not unreasonably affect uses and will not cause water quality to be less than water quality objectives and that the discharge provides protection for existing in-stream uses and water quality necessary to protect those uses.

The complete analysis is comprised of two main components: (1) a comparison of receiving water quality to the water quality objectives and/or criteria used to protect designated beneficial uses, and (2) a socio-economic analysis to establish the balance between the proposed additional flow increase and the public interest.

2 REGULATORY ANTIDEGRADATION REQUIREMENTS

2.1 FEDERAL AND STATE ANTIDEGRADATION POLICIES

Antidegradation policies have been issued at both the federal and state level (RBI 2006). These policies are intended to protect existing water quality. The federal policy, originally adopted in 1975, is expressed as a regulation in 40 CFR 131.12. The federal policy requires that "water quality shall be maintained and protected". More specifically, the federal regulation requires the states to develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy. The antidegradation policy and implementation methods shall, at a minimum, be consistent with ensuring that existing water uses and the level of water quality necessary to protect these uses shall be maintained and protected. Where the quality of waters exceed levels necessary to support beneficial uses, measures shall be taken to ensure that water quality is maintained and protected unless the State finds that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

The federal antidegradation policy is designed to protect existing uses and the level of water quality necessary to protect existing uses, and provide protection for higher quality and outstanding national water resources. The federal policy directs states to adopt a statewide policy that includes the following primary provisions; these provisions have since become used to classify water body quality as TIER 1, TIER 2, or TIER 3 waters (Title 40 of the Code of Federal Regulations, Section 131.12 (40 CFR 131.12)):

<u>TIER I WATERS</u>
Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

<u>TIER II WATERS</u> – High Quality Waters
Where the quality of waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

<u>TIER III WATERS</u> – Outstanding National Resource Waters
Where high quality waters constitute an outstanding national resource, such as waters of national and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

The United States Environmental Protection Agency (U.S. EPA), Region 9 published Guidance on Implementing the Antidegradation Provisions of 40 CFR *131.12* (USEPA 1987). The document provides general program guidance for states in Region 9 on developing procedures for implementing antidegradation policies.

In August 2005, the U.S. EPA issued a memorandum discussing Tier 2 antidegradation reviews and significance thresholds (U.S. EPA 2005). The use of a 10% reduction in available assimilative capacity as a significance threshold was considered "to be workable and protective in identifying those significant lowerings of water quality that should receive a full tier 2 antidegradation review, including public participation" (U.S. EPA 2005), "Given the different approaches states and tribes have taken recently to define significance, it is important to clarify that the most appropriate way to define a significance threshold is in terms of assimilative capacity...Further, given the importance of public participation and transparency, it is clear that a definition of significance that directly links to the resource to be protected (assimilative capacity) is more likely to be understood by the public."

2.2 State Antidegradation Policy and Guidance

The State Water Resources Control Board (SWRCB) has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy (CVRWQCB 1998). Resolution No. 68-16 states, in part:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3 WATER QUALITY STANDARDS

3.1 BENEFICIAL USES

Putah Creek is a Tier 2 water body. The beneficial uses of Putah Creek are municipal and domestic supply, agricultural irrigation and stock watering; body contact recreation, canoeing, rafting, and other non-body contact recreation; warm and potentially cold freshwater aquatic habitat; warm spawning habitat, and wildlife habitat (CRWQCB 1998).

3.2 WATER QUALITY OBJECTIVES/WATER QUALITY CRITERIA

To protect the designated beneficial uses, the Regional Board applies water quality objectives contained in the Basin Plan and other water quality criteria to the receiving water, the South Putah Creek. Water quality objectives for toxic constituents come from the California Toxics Rule, as promulgated by the U.S. EPA. (40 CFR §131.38). For constituents not listed in the California Toxics Rule and in the absence of an adopted numeric objective, the Regional Board interprets narrative water quality objectives using water quality criteria developed from other sources. The Regional Board uses these objectives and criteria to determine whether the university's discharge will cause or contribute to a violation of an applicable water quality standard. The following objectives and criteria are used, as applicable:

1. Water quality objectives from the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan);
2. Water quality objectives from the California Toxics Rule (CTR);
3. Maximum Contaminant Levels (MCLs) specified in Title 22 of the California Code of Regulation and incorporated by reference into the Basin Plan;
4. USEPA ambient water quality recommended criteria and other criteria commonly used by the Regional Board to interpret narrative objectives in the Basin Plan.

Table 1 presents the most conservative water quality objectives that may apply to the South Fork Putah Creek for constituents for which there is an adopted numeric water quality objective. Hardness-based objectives for metals listed in the California Toxics Rule were calculated for each month using the lowest hardness observed in the creek. Table 1 also includes other water quality criteria commonly applied by the Regional Board to other constituents.

Table 1: Potentially Applicable Water Quality Objectives and Criteria for the South Putah Creek

Constituent	Units	Objective or Criteria	Reference
Antimony	µg/L	6.0	Primary MCL
Arsenic	µg/L	10	Primary MCL
Beryllium	µg/L	4.0	Primary MCL
Cadmium [a]	µg/L	3.9	CTR - Freshwater, Chronic
Chromium (III)	µg/L	50	Primary MCL
Chromium (VI)	µg/L	11	CTR - Freshwater, Chronic
Copper [a]	µg/L	15	CTR - Freshwater, Chronic
Lead [a]	µg/L	6.7	CTR - Freshwater, Chronic

Table 1: Potentially Applicable Water Quality Objectives and Criteria for the South Putah Creek			
Constituent	Units	Objective or Criteria	Reference
Mercury	µg/L	0.051	CTR - Human health (MUN)
Nickel [a]	µg/L	86	CTR - Freshwater, Chronic
Selenium	µg/L	5.0	CTR - Freshwater, Chronic
Silver [a]	µg/L	11	CTR - Freshwater, Acute
Thallium	µg/L	6.3	CTR - Human health (MUN)
Zinc [a]	µg/L	200	CTR - Freshwater, Acute
Cyanide	µg/L	5.2	CTR - Freshwater, Chronic
Asbestos	µg/L	7,000,000	Primary MCL
2,3,7,8 TCDD	µg/L	1.3×10^{-08}	CTR - Human health (MUN)
Acrolein	µg/L	320	CTR - Human health (MUN)
Acrylonitrile	µg/L	0.059	CTR - Human health (MUN)
Benzene	µg/L	1.0	Primary MCL
Bromoform	µg/L	4.3	CTR - Human health (MUN)
Carbon Tetrachloride	µg/L	0.23	CTR - Human health (MUN)
Chlorobenzene	µg/L	70	Primary MCL
Chlorodibromomethane	µg/L	0.41	CTR - Human health (MUN)
Chloroethane	µg/L		None
2-Chloroethylvinyl ether	µg/L		None
Chloroform	µg/L	80	Primary MCL
Dichlorobromomethane	µg/L	0.56	CTR - Human health (MUN)
1,1-Dichloroethane	µg/L	5.0	Primary MCL
1,2-Dichloroethane	µg/L	0.38	CTR - Human health (MUN)
1,1-Dichloroethylene	µg/L	0.057	CTR - Human health (MUN)
1,2-Dichloropropane	µg/L	0.52	CTR - Human health (MUN)
1,3-Dichloropropylene	µg/L	0.50	Primary MCL
Ethylbenzene	µg/L	300	Primary MCL
Methyl Bromide	µg/L	48	CTR - Human health (MUN)
Methyl Chloride	µg/L	None	
Methylene Chloride	µg/L	4.7	CTR - Human health (MUN)
1,1,2,2-Tetrachloroethane	µg/L	0.17	CTR - Human health (MUN)
Tetrachloroethylene	µg/L	0.80	CTR - Human health (MUN)
Toluene	µg/L	150	Primary MCL
1,2-Trans-Dichloroethylene	µg/L	10	Primary MCL
Bis(2Chloroethoxy)Methane	µg/L		None
Bis(2-Chloroethyl)Ether	µg/L	0.031	CTR - Human health (MUN)
Bis(2-Chloroisopropyl)Ether	µg/L	1,400	CTR - Human health (MUN)
Bis(2-Ethylhexyl)Phthalate	µg/L	1.8	CTR - Human health (MUN)
4-Bromophenyl Phenyl Ether	µg/L		None
Butylbenzyl Phthalate	µg/L	3,000	CTR - Human health (MUN)
2-Chloronaphthalene)	µg/L	1,700	CTR - Human health (MUN
4-Chlorophenyl Phenyl Ether	µg/L		None
Chrysene	µg/L	0.0044	CTR - Human health (MUN)
Dibenzo(a,h)Anthracene	µg/L	0.0044	CTR - Human health (MUN)
1,2-Dichlorobenzene	µg/L	600	Primary MCL
1,3-Dichlorobenzene	µg/L	400	CTR - Human health (MUN)
1,4-Dichlorobenzene	µg/L	5.0	Primary MCL
3,3 Dichlorobenzidine	µg/L	0.040	CTR - Human health (MUN

Table 1: Potentially Applicable Water Quality Objectives and Criteria for the South Putah Creek			
Constituent	Units	Objective or Criteria	Reference
Diethyl Phthalate	µg/L	3	USEPA Ambient Water Quality - Chronic
Dimethyl Phthalate)	µg/L	313,000	CTR - Human health (MUN)
Di-n-Butyl Phthalate	µg/L	2,700	CTR - Human health (MUN)
2,4-Dinitrotoluene	µg/L	0.11	CTR - Human health (MUN)
2,6-Dinitrotoluene	µg/L		None
Di-n-Octyl Phthalate	µg/L		None
1,2-Diphenylhydrazine		0.040	CTR - Human health (MUN)
Fluoranthene	µg/L	300	CTR - Human health (MUN
Fluorene	µg/L	1,300	CTR - Human health (MUN
Hexachlorobenzene	µg/L	0.00075	CTR - Human health (MUN)
Hexachlorobutadiene)	µg/L	0.44	CTR - Human health (MUN)
Hexachlorocyclopentadiene	µg/L	50	Primary MCL
Hexachloroethane	µg/L	1.9	CTR - Human health (MUN)
Indeno(1,2,3-cd)Pyrene	µg/L	0.0044	CTR - Human health (MUN)
Isophorone	µg/L	8.4	CTR - Human health (MUN)
Naphthalene	µg/L		None
Nitrobenzene	µg/L	17	CTR - Human health (MUN)
N-Nitrosodimethylamine	µg/L	0.00069	CTR - Human health (MUN)
N-Nitrosodi-n-Propylamine	µg/L	0.0050	CTR - Human health (MUN)
N-Nitrosodiphenylamine	µg/L	5.0	CTR - Human health (MUN)
Phenanthrene	µg/L		None
Pyrene	µg/L	960	CTR - Human health (MUN)
1,2,4-Trichlorobenzene	µg/L	5.0	Primary MCL
Aldrin	µg/L	0.00013	CTR - Human health (MUN)
alpha-BHC	µg/L	0.0039	CTR - Human health (MUN)
beta-BHC	µg/L	0.014	CTR - Human health (MUN)
gamma-BHC)	µg/L	0.019	CTR - Human health (MUN)
delta-BHC	µg/L		None
Chlordane	µg/L	0.00057)	CTR - Human health (MUN
4,4'-DDT	µg/L	0.00059	CTR - Human health (MUN)
4,4'-DDE	µg/L	0.00059	CTR - Human health (MUN)
4,4'-DDD	µg/L	0.00083	CTR - Human health (MUN)
Dieldrin	µg/L	0.00014)	CTR - Human health (MUN
alpha-Endosulfan	µg/L	0.056	CTR - Freshwater, Chronic
beta-Endolsulfan	µg/L	0.056	CTR - Freshwater, Chronic
Endosulfan Sulfate	µg/L	110	CTR - Human health (MUN)
Endrin	µg/L	0.036	CTR - Freshwater, Chronic
Endrin Aldehyde	µg/L	0.76	CTR - Human health (MUN
Heptachlor	µg/L	0.00021	CTR - Human health (MUN)
Heptachlor Epoxide	µg/L	0.00010	CTR - Human health (MUN)
Polychlorinated biphenyls	µg/L	0.00017	CTR - Human health (MUN)
Toxaphene	µg/L	0.00020	CTR - Freshwater, Chronic
Chlorine, total residual	mg/L	0.011	USEPA Ambient Water Quality - Chronic
Electrical Conductivity	µmhos/ cm	900	UC Davis EC limit of 900
pH	SU	6.5-8.5	Basin Plan
Total dissolved solids	mg/L	560	Based on UC Davis EC limit of 900 µmhos/cm
Aluminum	µg/L	87	USEPA Ambient Water Quality - Chronic

Constituent	Units	Objective or Criteria	Reference
Table 1: Potentially Applicable Water Quality Objectives and Criteria for the South Putah Creek			
Barium	µg/L	1,000	Primary MCL
Iron [c]	µg/L	300	Secondary MCL
Manganese [c]	µg/L	50	Secondary MCL
Molybdenum	µg/L	10	Agricultural goal
Chloride	mg/L	106	Agricultural goal
Fluoride	µg/L	2,000	Primary MCL
Ammonia-N [d]	mg/L	0.47	USEPA Ambient Water Quality - Chronic
Nitrate + Nitrite as N Primary	mg/L	10	MCL
Phosphorus, Total (as P)			None
Sulfate	mg/L	250	Secondary MCL
MBAS	µg/L	500	Secondary MCL
Methyl-tert-butyl ether (MTBE)	µg/L	5.0	Secondary MCL
Tributyltin	µg/L	0.063	USEPA Ambient Water Quality - Chronic
Chlorpyrifos	µg/L	0.041	USEPA Ambient Water Quality - Chronic
Diazinon	µg/L	0.05	Basin Plan - Chronic
Thiobencarb	µg/L	1.0	Secondary MCL

[a] Hardness dependent (hardness of 180 mg/L selected).
[b] pH dependent (pH of 7.8 selected).
[c] Water quality objectives are provided for dissolved concentrations. Analyses presented in this report compare the total concentration data to dissolved objectives.
[d] pH and temperature dependent (pH of 7.8 and temperature of 22.6 °C selected).

3.3 303(d) LISTINGS

Section 303(d) of the Clean Water Act requires States to develop lists of water bodies (or segments of water bodies) that do not attain water quality standards after implementation of minimum required levels of treatment by point-source dischargers (i.e., municipalities and industries). Section 303(d) requires States to develop a total maximum daily load (TMDL) for each of the listed pollutant and water body combinations for which there is impairment.

3.4 NPDES PERMIT REQUIREMENTS

The campus WWTP presently discharges treated effluent to the South Fork Putah Creek under the requirements of NPDES permit No. CA0077895 (Order No.R5-2003-0003), issued by the Central Valley Regional Board in March 2003. Table 2 identifies the effluent limits contained in the university's NPDES permit as adopted by the Regional Board in Order No. R5-2003-0003.

Table 2: Effluent Limits for the UC Davis WWTP to the South Putah Creek						
Constituents	Units	Monthly Average	Weekly Average	7-Day Median	7-Day Average	Daily Maximum
BOD[1]	mg/l	10[2]	15[2]	---	---	25[2]
	Ib/day[3]	225	338	---	---	560
Total Suspended Solids	mg/l	10[2]	15[2]	---	---	25[2]
	Ib/day[3]	225	338	---	---	560
Total Coliform	MPN/100ml	---	---	2.2	---	23
Settable Solids	ml/l	---	---	---	---	0.1
Turbidity	NTU	---	---	---	2	5[4]

Note:

[1] 5-day, 20°C biochemical oxygen demand

[2] To be ascertained by a 24-hour composite

[3] Based upon a design treatment capacity of 2.7 mgd (*x* mg/*l* x 8.345 x 2.7 mgd = *y* lbs/day)

[4] The turbidity shall not exceed 5 NTU more than 5 percent of the time within a 24-hour period. At no time shall the turbidity exceed 10 NTU.

Table 3: Additional Effluent Limits for UC Davis WWTP to the South Putah Creek					
Constituents	Units	Monthly Average	4-Day Average	Daily Average	1-Hour Average
Total Residual Chlorine	mg/l	---	0.01	---	0.02
	lbs/day[3]	----	0.225	---	0.45
Ammonia(as N)	mg/l	1.94[1]	---	---	11.4
	lbs/day[3]	---	---	---	---
Nitrate + Nitrite(as N)	mg/l	10	---	---	---
	lbs/day[3]	225	---	---	---
Aluminum	µg/l	---	87	---	750
	lbs/day[3]	---	1.9	---	16.8
Cyanide	µg/l	---	5.2	---	22
	lbs/day[3]	---	0.11[3]	---	0.5
Copper	µg/l		15[4]	---	---
	lbs/day[3]		---	---	---
Dichloromethane	µg/l	4.7	---	---	---
	lbs/day[3]	0.1	---	---	---
Dioxin/Furans	pg/l	0.014	---	---	---
	lbs/day[3]	0	---	---	---
Iron	µg/l	300	---	---	---
	lbs/day[3]	6.8	---	---	---
Electrical Conductivity	µhoms/cm	900			

Note:

[1] Based on the worst condition, high pH and temperature

[2] To be ascertained by a 24-hour composite

[3] Based upon a design treatment capacity of 2.7 mgd (*x* mg/*l* x 8.345 x 2.7 mgd = *y* lbs/day)

[4] Based on the lowest effluent hardness

4 ENVIRONMENTAL SETTING

The University WWTP discharge outfalls at the Arboretum Waterway and South Fork Putah Creek are shown on Figure 1.

Summary statistics for effluent quality and Putah Creek water quality are provided in Appendix III and Appendix IV, respectively.

4.1 HYDROLOGY

South Putah Creek originates from springs on Cobb Mountain, which is part of the Mayacmas Mountains located on the western edge of Lake and Napa counties. The upper watershed flows southeast into Lake Berryessa. From Lake Berryessa's Monticello Dam, Putah Creek flows east to the Putah Diversion Dam. Below the diversion point, the waterway flows through Winters, along the southern boundary of Russell Ranch, along the southern boundary of UC Davis' west and south campuses, and eventually into the Yolo Bypass, an overflow channel for the Sacramento River (UC Davis 1997, Moyle 1999). After the Yolo Bypass, water then enters the Delta.

To ensure year around flow in the Putah Creek, a water releasing Accord was enacted in 2000 The Putah Creek Accord (Accord) guarantees a minimum flow of 5 cfs (cubic feet per second) that water releases from the Monticello Dam is sufficient to provide surface water flow all the way to the Yolo Bypass, with additional provisions for specific releases to aid fisheries resources (see Appendix II).

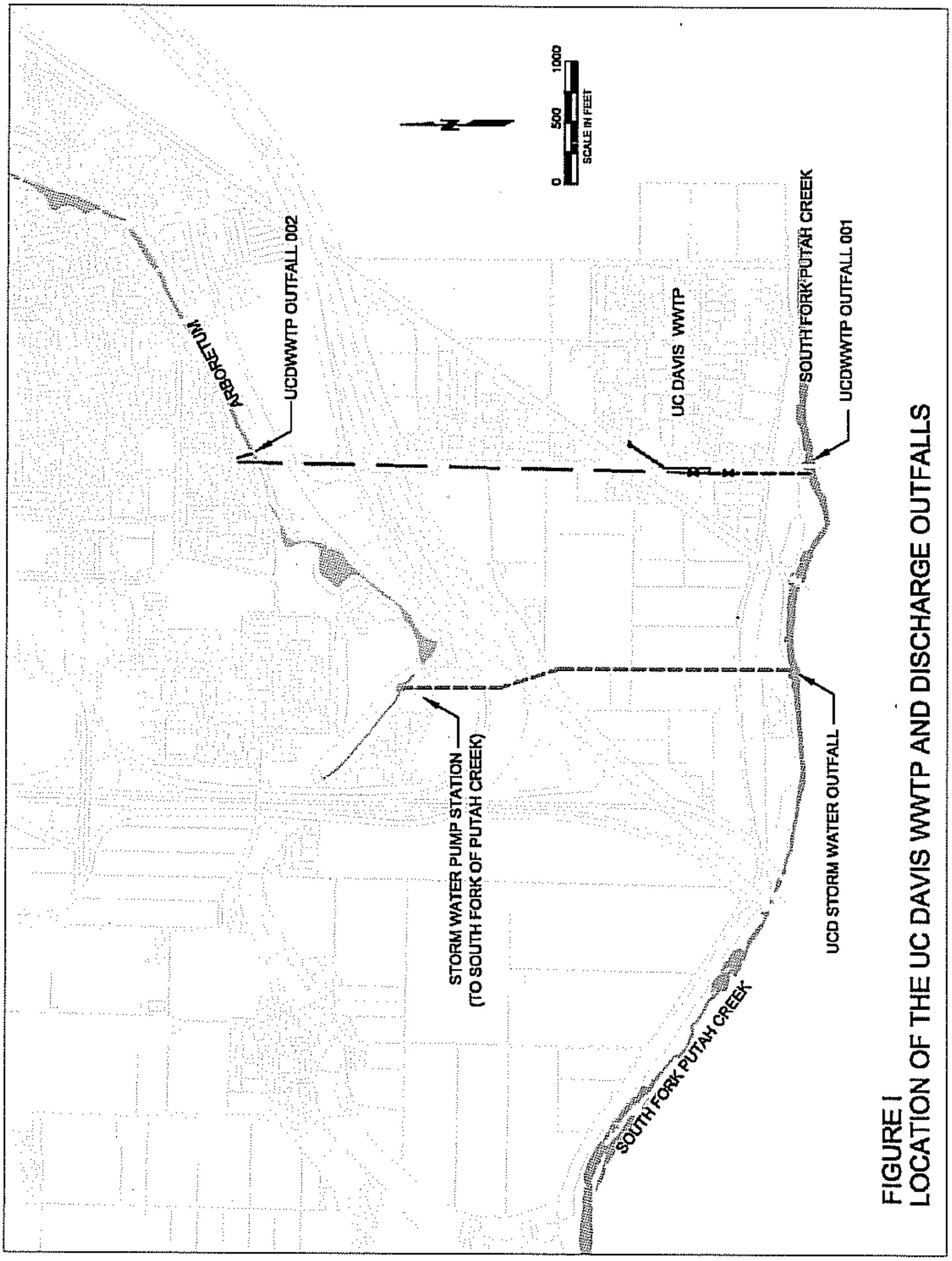

FIGURE I
LOCATION OF THE UC DAVIS WWTP AND DISCHARGE OUTFALLS

5 ASSESSMENT OF WATER QUALITY IMPACTS

5.1 Mass Balance

To determine if increasing design ADWF capacity of from 2.7 mgd to 3.6 mgd would adversely affect Putah Creek water quality conditions downstream of the WWTP discharge point, two questions must be answered. First, would the downstream concentration of Putah Creek exceed applicable water quality objectives if the WWTP discharge were increased to 3.6 mgd? Second, would the increase in the WWTP permitted design capacity from 2.7 mgd to 3.6 mgd potentially violate the state and federal antidegradation policies?

To answer these questions, chemical concentrations for individual constituents in Putah Creek downstream of the discharge were estimated by a mass balance calculation using upstream receiving water (sample location R1 approximately 30 feet upstream from the WWTP discharge) and effluent concentrations, and receiving water and effluent flows.

The receiving water quality concentrations projected with the mass-balance approach were compared to the lowest applicable regulatory water quality criteria for impact assessment. Using mass balance, constituent concentration at R2 can defined as:

$$C_{R2} = \frac{C_{R1} \times Q_{R1} + C_{eff.} \times Q_{eff.}}{Q_{R1} + Q_{eff.}}$$

Where:
C_{R2} = South Fork Putah Creek concentration, downstream
Q_{R1} = South Fork Putah Creek flow
C_{R1} = South Fork Putah Creek concentration, upstream
Q_{eff} = Discharge rate
C_{eff} = Effluent concentration

Assimilative capacity is the capacity in the receiving water to receive treated effluent without deleterious effects and without damage to aquatic life or humans who consume the water. The assimilative capacity is the concentration increment between the ambient water quality and the water quality standard (WQS) and can be calculated by following equation:

$$\textit{Assimilative Capacity} = WQS \quad \frac{(C_{R1} \times Q_{R1} + C_{eff} \times Q_{eff})}{(Q_{R1} + Q_{eff})}$$

The percentage of assimilative capacity is defined as the change in downstream receiving water Concentration due to the flow increase, measured at R2, divided by the assimilative capacity.

5.2 Critical Flows

The worst case analysis would assume the projected WWTP effluent quality conditions without any dilution (e.g., no upstream flows in Putah Creek). However, when there is no flow, there would be no need for an assessment of impact as there would be no existing water quality to protect. However, during the period of discharge, the creek always has some measurable flow and the expected the probability of zero flow in the creek has decreased considerably because of the Accord (see Appendix II). Under the agreement, the Bureau of Reclamation and Solano County Water Agency now must operate water deliveries with the specific objective of maintaining sufficient storage in Lake Berryessa to ensure that Accord flow conditions can be met at the lower south Putah Creek throughout the year.

5.3 Water Quality Measurements

Acute aquatic life criteria are typically based on 1-hour exposure which is far shorter than the typical monitoring frequency for many constituents. Chronic aquatic criteria are typically based on short-term chronic 4-day exposures. To be protective to aquatic life beneficial use, the maximum, measured effluent and receiving water concentrations are used as a conservative measure of representative water quality.

Long-term human health effects and other long-term criteria (e.g., agriculture) are much less senstitive to short-term exceedances of the criteria. Thus, for long-term human health and other effects, the representative water quality is the mean of the measured effluent and receiving water concentrations which reflects the overall, long-term water quality and potential for degradation of beneficial uses.

Table 4 summarizes the critical flows and representative effluent and receiving water quality measurements used to assess potential lowering of water quality from increased UCDWWTP discharge.

Table 4. Summary of critical flows and representative water quality

Criteria/Beneficial Use	Critical Flow	Flow from Existing Dataset	Effluent and Receiving Water Quality
Acute aquatic life Acute human health	1Q10	0.78 mgd, minimum measured flow	Maximum measured concentration
Chronic aquatic life	7Q10	1.56 mgd, minimum measured flow	Maximum measured concentration
Long-term human health Other long-term	Harmonic mean	18.4 mgd	Mean of measure concentrations

Many constituents have "non-detect" values in the data set. For purposes of calculating average concentrations, one-half the reporting limit is used for non-detects. For many pollutants, this approach greatly overestimates the actual concentrations.

5.4 Mass Loading Assessment of Water Quality

Although bioaccumulation is considered in the development of human health and aquatic life criteria, the nature of downstream water bodies may facilitate extended residence time or deposition of contaminants. This would lead to an accumulation of bioaccumulative constituents in downstream water bodies and/or sediments. Therefore, mass loadings also were considered in order to assess potential lowering of downstream water quality from bioaccumulative constituents in the increased UCDWWTP discharge. The assessment of available mass loading assimilative capacity is: (1) the maximum mass load, at R2 with the project, that the water body could carry without exceeding the WQC/WQO, (2) minus the upstream load and previously permitted/existing loads.

$$\text{Available Mass Loading} = WQS\times(Q_{R2,\,(3.6+R1)\,mgd}) - (Q_{R1}\times C_{R1}) - (Q_{Eff,\,2.7\,mgd}\times C\ Q_{Eff,\,2.7\,mgd})$$

The mass loading use of assimilative capacity is the new load divided by the assimilative capacity.

Since mass loading accumulation is a long-term impact, the harmonic mean flow for Putah Creek was used to assess potential long-term transport and impacts of bioaccumulative constituents on downstream water bodies. For similar reasons, the average receiving water and effluent concentrations were used to assess impacts of bioaccumulative constituents on downstream water bodies.

5.5 Existing Water Quality Monitoring Data

South Fork Putah Creek water quality is characterized from monitoring data collected from January 2002 through December 2002 in response to RWQCB's request pursuant to California Water Code Section 13267 letters. Effluent water quality is characterized from Discharger Self-Monitoring Reports from January 2004 through August 2007 (UCD 2004, 2005, 2006 and 2007). These data are selected because they represent most current effluent quality.

5.6 303(D) Listed and Other Non-High Quality Water Body Constituents

The SWRCB (2006) has listed Putah Creek as impaired, in accordance with Section 303(d) of the Clean Water Act, due to elevated levels of mercury in one or more creek samples that exceed the DHS primary and secondary MCLs. The 303(d) also identified that the contaimintion sources are due to the abandoned mines. The Total Maximum Daily Load (TMDL) of mercury in Delta will be discussed in December Regional Water Board meeting and potentially the Water Boards will adopt a TMDL for mercury in the Delta. Since Putah Creek is a tributary of the Delta, it is likely a TMDL of mercury will be included in future discharge effluent limits.

Table 5 lists the constituents in the receiving water that exceed water quality standards upstream of the discharge and thus do not trigger a balancing of the proposed action with public interest of the State. These constituents (aluminum, mercury, cyanide and iron) are not addressed further in this analysis. When the receiving water exceeds objectives and the constituent is detected in the effluent, the Inland Surface Water, Enclosed Bays, and Estuaries of California (SIP) independently provides the means to prevent further degradation of the receiving water through the implementation of effluent monitoring for that constituent and may impose effluent limitations. Constituents that may be imposed for effluent limits are discussed in the following section.

Table 5. Constituents in receiving water that exceed water quality standards at upstream of the discharge (R1)

Aluminum	Dichloromethane	Mercury[1)]
Cyanide	Iron	
Note: [1)] On 2006 303(d) list of impaired water bodies for Putah Creek		

5.7 Existing Effluent Quality

A new Report of Waste Discharge was developed by the University and submitted to the RWQCB in August 2007. As part of that effort to characterize plant effluent for the upcoming discharge permit renewal application, the University preformed a Reasonable Potential Analysis (RPA) and identified constituents of concern for which new effluent limitations might be stipulated in the NPDES permit. The implementation of effluent limitations is meant to ensure that beneficial uses are protected. Table 6 lists those constituents identified in the RPA.

Table 6. Constituents that could receive new effluent limitations in the renewed NPDES permit.

Aluminum	Dichloromethane	Chloroform
Chloride	Nitrite & Nitrate	Electrical conductivity
Bis(2-ethylexyl)phthalate	Selenium	

For Bis(2-ethylexyl)phthalate and Aluminum, the criteria-dependent representative water quality measurement would exceed the relevant criteria indicating there is no assimilative capacity available under the existing creek baseline conditions. Both constituents exceeded the Water Quality Criteria for the samples collected from the South Fork Putah Creek Upstream of the WWTP discharge point (R1), as a result, no existing assimilative capacity available. When this occurs, it is not possible to calculate the mass balance percent utilization of assimilative capacity. Since effluent limitations will be imposed to protect beneficial uses, the effluent will not be able to cause the receiving water quality to exceed the relevant standard and thus the mass balance utilization of assimilative capacity will be capped by the effluent limitation. In this case, using the average concentrations for effluent and receiving water is appropriate because it allows for the calculation of assimilative capacity utilization and is representative of the day-in day-out receiving water quality.

6 INCREMENTAL CHANGES IN SOUTH PUTAH CREEK WATER QUALITY

The following sections describe the incremental change in Putah Creek water quality that are predicted to occur by increasing the University WWTP's permitted discharge rate from 2.7 mgd ADWF to 3.6 mgd ADWF, and the effect of that increase on water quality.

6.1 Constituents Concentrations

Table 7 presents the incremental change in water quality for detected constituents. Table 7 also identifies the available assimilative capacity (criterion minus R2 concentration at 2.7 mgd discharge rate), and the percent of remaining assimilative capacity used by the 0.9 mgd ADWF incremental increase in discharge proposed. For each constituent in Table 5 a determination has been made about the significance of the change in water quality. If further analysis is needed, it is so noted and will be discussed in later sections.

As shown in Table 7, increasing the UCDWWTP discharge to Putah Creek from 2.7 mgd to 3.6 mgd would not result in lowered water quality at significance threshold for any constituents that could potentially become effluent limits. In fact, the downstream concentration for many constituents (e.g., bis(2-ethylhexyl)phthalate, ammonia, aluminum, chromium VI, iron, mercury and chromium) will actually decrease or essentially remain unchanged as a result of the plant expansion. This occurs because upstream concentrations of these constituents are higher than those found in the WWTP effluent.

Although the concentrations are still within Water Quality Objectives at the downstream Putah Creek of WWTP discharge, Table 5 shows that selenium and electrical conductivity (EC) will have some incremental increase and the use of existing creek assimilative capacity because of the proposed discharge flow increase. Both constituents are primarily due to the relatively high levels found in the campus domestic water supplies. As discussed later, the University has already identified EC as a source of concern due to permit non-compliance and is developing solutions to reduce EC levels. As the University implements corrective action plans to achieve permit compliance, both constituents will be significantly reduced.

Table 7. Incremental change in Putah Creek water quality due to future discharges of consituents without effleunt limits and comparison to applicabel water standards.

Constituent	Units	Effluent Detection Frequency	Conentration in Putah Creek (R2) downstream of UCDWWTP Outfall			Lowest Applicable Water Quality Criteria		Assimialtive Capcity		Future Analysis
			Current (2.7 mgd) Discharge Rate	Future (3.8 mgd) Discharge Rate	Increase	Value	Basis	Avaiable	Used by Expansion	
Conventionals										
Ammonia (as N)	mg/L	2%	4.42	4.04	-0.38	8.11	RAWQC[1]	3.69	0%	N
Chloride	mg/L	100%	28.69	33.62	4.93	230	RAWQC-ccc	201.31	2%	N
Foaming Agents (MBAS)	mg/L	100%	0.03	0.03	0.00	0.5	CA Secondary MCL	0.47	1%	N
Nitrate (as N)	mg/L	100%	1.76	1.99	0.22	10	California Primary MCL	8.24	3%	N
Phosphorous, Total (as P)	mg/L	100%	--	--	--	na	--	--	--	--
Specific conductance (EC)	umohs/cm	100%	555	577	22.00	900	UCD Effluent Limit	345.00	6%	Y
Sulfate	mg/L	91%	33.59	34.03	0.44	250	CA Secondary MCL	216.41	0%	N
Sulfide (as S)	mg/L	9%	--	--	--	--	--	--	--	--
Total Dissolved Solids	mg/L	100%	345	357	12.00	450	CA Secondary MCL	105.00	11%	N
Chloroform	ug/L	9%	0.27	0.28	0.01	80	California Primary MCL	79.73	0%	N
Dichloromethane	ug/L	7%	9.40	7.88	-1.52	4.7	CTR-hh	0	na	N
Acenaphthene	ug/L	9%	0.001	0.001	0.00	20	RAWQC	20.00	0%	N
Bis(2-ethylhexyl)phthalate	ug/L	91%	14.47	13.90	-0.57	1.8	NTR-HH	0	na	Y
Butyl benzyl phthalate	ug/L	55%	0.09	0.10	0.01	3	EPA-AQ-ccc	2.91	0%	N
Di-n-butylphthalate	ug/L	91%	1.66	1.34	-0.32	3	EPA-AQ-ccc	1.34	0%	N
Diethyl phthalate	ug/L	91%	1.15	0.94	-0.21	3	EPA-AQ-ccc	1.85	0%	N
Dimethyl phthalate	ug/L	9%	0.04	0.04	0.00	3	EPA-AQ-ccc	2.96	0%	N
Fluorene	ug/L	9%	0.001	0.001	0.00	1,300	CTR-hh	1300.00	0%	N
Trace Metals										N
Aluminum	ug/L	66%	140.97	136.23	-4.74	87	NAWQC-ccc	0	na	Y
Arsenic	ug/L	100%	2.08	2.19	0.10	10	USEPA Primary MCL	7.92	1%	N
Barium	ug/L	100%	98.48	96.82	-1.66	1000	California Primary MCL	901.52	0%	N
Cadmium	ug/L	45%	0.54	0.57	0.03	3.9	CTR-AQ-ccc	3.36	1%	N
Chromium	ug/L	100%	9.17	8.88	-0.29	50	California Primary MCL	40.83	0%	N
Chromium VI	ug/L	9%	0.602	0.578	-0.02	11	CTR-AQ-ccc	10.40	0%	N
Copper	ug/L	37%	6.38	6.40	0.02	15	CTR-AQ-ccc	8.62	0%	N
Fluoride	ug/L	91%	0.20	0.20	0.00	2000	California Primary MCL	1999.80	0%	N

Table 7. Incremental change in Putah Creek water quality due to future discharges of consituents without effleunt limits and comparison to applicabel water standards (continued)

Constituent	Units	Effluent Detection Frequency	Conentration in Putah Creek (R2) Current (2.7 mgd) Discharge Rate	Future (3.8 mgd) Discharge Rate	Increase	Lowest Applicable Water Quality Value	Basis	Assimialtive Capcity Avaiable	Used by Expansion	Future Analysis
Lead	ug/L	20%	2.41	2.43	0.02	6.7	CTR-AQ-ccc	4.29	0%	N
Mercury	ug/L	91%	0.01398	0.01302	-0.001	0.77	NAWQC-ccc	0.76	0%	N
Manganese	ug/L	91%	16.77	16.13	-0.64	50	California Secondary MCL	33.23	0%	N
Nickel	ug/L	100%	3.27	2.91	-0.36	86	NAWQC-ccc	82.73	0%	N
Selenium	ug/L	100%	5.28	5.54	0.26	5 [3]	NAWQC-ccc	0	na	N
Zinc	ug/L	100%	49.85	51.51	1.65	200	CTR-AQ-ccc	150.15	1%	N

CTR-AQ-ccc = California Toxics Rule criterion for the chronic protection of aquatic life. Based on a hardness of 180 mg/L as CaCO3.
CTR-AQ-cmc = California Toxics Rule criterion for the acute protection of aquatic life. Based on a hardness of 180 mg/L as CaCO3.
CTR-hh = California Toxics Rule criterion for the protection of human health (consumption of water and organisms).
NTR-hh = National Toxics Rule (USEPA) for sources of drinking water
California Primary MCL = California Department of Health Services Primary Maximum Contaminant Level.
CA Secondary MCL = California Department of Health Services secondary maximum contaminant level.
RAWQC = USEPA National Recommended Water Quality Criteria
NAWQC-ccc = USEPA National Ambient W Q Criteria / 4-day average
[1] Aquatic life criteria for ammonia based on effluent pH (7.8), which was the same pH the effluent ammonia of 2.54 was detected.
[2] based on lowest hardness measured in the creek (180 mg/L)
[3] Maimum effluent concentration exceeds criteria, which will likely receive an effluent limit.
na = not applicable, because no assimilative capacity is available.

6.2 Mass Loading Constituents

Bioaccumulative constituents detected in WWTP effluent are listed in Table 5. For both mercury and selenium, the area with the greatest likelihood of contributing to existing concerns is in the Delta. Although the organic forms of mercury and selenium have the greatest potential to bioaccumulate, inorganic monitoring data is more readily available and can be indicative of potential impacts.

Table 8. Bioaccumulative and other constituents that have been detected in UC Davis WWTP effluent

TDS (Total Dissolved Solids)	Selenium	Mercury[1)]
Note: [1)] On 2006 303(d) list of impaired water bodies for Putah Creek		

Table 8 presents the assessment of increased mass loadings of bioaccumulative constituents on incremental change in Putah Creek water quality. As shown in Table 9, With the exception of selenium, increasing the discharge from the WWTP to Putah Creek from 2.7 mgd to 3.6 mgd would not result in lowering water quality. The projected selenium mass loading will take 13.5% of existing creek assimilative capacity, which exceeds the 10% assimilative threshold. But the issue should be resolved once the University takes action to reduce EC levels, which will concurrently address selenium. For mercury, Table 8 shows a use of 0.06% assimilative capacity by the 0.9 mgd flow increment, which is well below the 10% threshold.

Table 9. Incremental change in Putah Creek water quality, on a mass loading basis, due to future discharges of Constituents

Constituent	Effluent Detection Frequency	Mass Loading to Putah Creek ($lbs/day \times 10^{-3}$)		Net Increase in Loading ($lbs/day \times 10^{-3}$)	Lowest Applicable Water Quality Criteria		Assimilative Capcity		Future Analysis
		Current (2.7 mgd) Discharge Rate	Future (3.6 mgd) Discharge Rate		Criteria lbs/MG	Basis	Avaiable lbs ($lbs/day \times 10^{-3}$)	Used by Expansion	
Conventionals									
TDS	100%	14,360 (lbs/day)	19,150 (lbs/day)	4,790 (lbs/day)	4,170	DHS MCL	1,956	na	N
Trace Metals									
Mercury	91%	0.051	0.068	0.02	6.422	CTR-HH	28	0.06%	N
Selenium	100%	34.68	42.24	7.56	41.70	CTR-AQ-ccc	56	13.50%	N

Notes:

Basin Plan = Water Quality Control Plan objective for the Sacramento and San Joaquin Rivers basins.

CTR-HH = California Toxics Rule criterion for the protection of human health (consumption of water and organisms).

DHS MCL = Department of Health Services maximum contaminant level.

na = not applicable, because no assimilative capacity is available.

6.3 Effects of Receiving Water Quality Changes

Mercury
The most stringent applicable water quality criterion for mercury is the CTR human health criterion (consumption of water and organisms) of 0.77 μg/L. Concentrations in Putah Creek and the UCDWWTP effluent are well below this criterion, an average concentration of 0.01 μg/L and 0.0023 μg/L, respectively. However, mercury mass loads are of concern, because mercury is known to bioaccumulate in fish tissue. The Sacramento-San Joaquin Delta is currently listed as impaired due to mercury and CVRWQCB is developing a total maximum daily load for the Delta (CVRWQCB 2005). Putah Creek is tributary to the Delta and has been identified as impaired due to mercury. Increased discharges from the UCDWWTP would contribute an additional mass load of mercury to Putah Creek. Applying the average effluent mercury concentration of 0.0023 μg/L at the additional incremental discharge rate of 0.9 mgd (future permitted capacity of 3.6 mgd minus the current permitted capacity of 2.7 mgd), results in an annual increase in mercury load of 0.007 pounds per year (0.0032 kilograms (kg) per year). By comparison, annual mercury loads to the Delta from tributary and in-Delta sources are approximately 222 kg per year (CVRWQCB 2005). Thus, the increment from the WWTP expansion would constitute less than 0.0014% of the annual Delta load. As such, the incremental increase in mercury load would not have a measurable or meaningful effect on mercury fish tissue concentrations in Delta waters and, therefore, would not adversely affect beneficial uses.

TDS: Total Dissolved Solids
The beneficial use of Putah Creek most sensitive to TDS is agriculture. The basis for the criteria is a long-term average assuming no rainfall and other site assumptions. The relevance of this criterion has not been assessed in relation to site-specific characteristics. However, a 900 umhos/cm of EC has been imposed in the UC Davis WWTP discharge Limits, which is considered to be a surrogate for TDS-related impacts. The analysis for EC (below) is considered to apply equally to TDS.

EC: Electrical Conductivity
Discharges of WWTP effluent under the expansion project would contain EC concentrations in the undiluted WWTP effluent that would likely exceed the existing NPDES permit limit. Nevertheless, projected EC concentrations in receiving water would be expected to be protective of existing beneficial uses. In other words, the existing effluent limitation is more restrictive than is necessary to protect beneficial uses.

Currently the University has a monthly EC limit of 900 μmhos/cm in its NPDES permit and the WWTP discharge is consistently found to exceed this limit. However, EC values in Putah Creek downstream of the WWTP discharge only rarely exceed this EC level. Data presented Appendix V shows that the mean EC concentrations in Putah Creek has remained fairly consistent during the 2004-2007 periods. Only 6 out of 879 samples collected from the downstream of the WWTP discharge have shown EC concentration exceeded the 900 μmhos/cm. Since EC impacts are based on average concentrations, Putah Creek has been in compliance with 900 μmhos/cm standard. On average, concentrations of EC downstream of the WWTP are slightly higher than upstream. The average observed EC concentration for R1 and R2 is 475 μmhos/cm and 571 μmhos/cm, respectively. The calculated EC for R2 using current 2.7 design flow is 555 μmhos/cm, which is close to the observed 571 μmhos/cm at R2.

The mass balance calculation in Table 5 indicates discharge flow increase to 3.6 mgd would result in projected downstream EC concentration of 577 μmhos/cm in Putah Creek, which does not exceed the drinking water MCL of 900 μmhos/cm. Given the fact that the EC limit is already in place, the University is moving forward with plans to improve source water quality, and thus drop effluent EC levels. The University is eliminating large water softeners which contribute to EC loading, and is considering several options to bring in new sources of surface water to replace existing groundwater supplies. Ultimately, the University will be able to comply with the effluent EC limit. In turn, no impacts to the South Fork Putah Creek are anticipated in association with the WWTP expansion.

Bis (2-ethylhexyl phthalate)
Bis (2-ethylhexyl phthalate) was detected 91% in the effluent and is likely received effluent limit, but the concentration is below the criteria level. The relevant criteria is long-term human health-based criteria. Moreover, incremental increase in discharge from the WWTP from 2.7 mgd to 3.6 mgd will improve the future Putah Creek water quality. Based on the calculation from the mass balance, there will be a 4% decrease in concentration for this constituent (see Table 5), as a result of 0.9 mgd incremental increase in discharge. The reason is because the average baseline concentration in the creek is much higher than in the effluent and additional effluent flow will enhance the concentration in the creek.

pH
The NPDES permit for the UCDWWTP has an effluent limitation that requires discharges to have a pH between 6.5 and 8.5. Based on the current science regarding pH requirements of freshwater aquatic life, the beneficial use of Putah Creek are sensitive to changes in pH. Since the plant expansion will not alter the characteristics in the incoming wastewater as well as treatment processes, future discharges, regardless of volume, would not cause Putah Creek pH to fall outside this range. This is confirmed by the pH measurements in Putah Creek and effluent as presented in Table 10. Only two effluent pH measurements out of 1070 have been below 6.5. Both the effluent and creek pH ranges are similar. Thus, the incremental increase in discharge would not result in a lowering of water quality with respect to pH, and beneficial uses of downstream Putah Creek will not be affected by the incremental change in pH under the expanded discharge.

Table 10. pH levels in Putah Creek and the UC Davis Wastewater Treatment Plant effluent.			
Parameters	**Effluent**	**Putah Creek Upstream of Outfall (R1)**	**Putah Creek Downstream of Outfall (R2)**
Count	**365**	**52**	**52**
Mean	**7.8**	**8.1**	**8.1**
Median	**7.8**	**8.1**	**8.1**
Minimum	**7.1**	**7.5**	**7.6**
Maximum	**8.1**	**8.8**	**8.5**
Data was collected weekly from January through December, 2006.			

Dissolved Oxygen

The components of wastewater with the potential to affect dissolved oxygen (DO) concentrations include biochemical oxygen demand (BOD) and ammonia. The NPDES permit contains monthly average (10 mg/L), weekly average (15 mg/L), and daily average (25 mg/L) effluent limits for BOD, and limits for ammonia, based on the U.S. EPA's recommended water quality criteria for aquatic life. The NPDES permit also has a DO limitation for Putah Creek that states the discharge shall not cause the DO to fall below 7.0 mg/L, which is derived from the Basin Plan objective for DO.

The WWTP produces Title 22 quality, tertiary-treated effluent characterized by low concentrations of BOD (typically less than 2 mg/L) and ammonia (typically less than 0.5 mg/L as nitrogen). As discharge rates increase in the future, the proportion of creek water constituted by effluent also would increase, thereby increasing the relative portion of BOD and ammonia load. Thus, the incremental increase in discharge could result in the lowering of water quality with respect to DO. Available information is insufficient to determine if creek DO levels would be reduced below Basin Plan objectives, due to the discharge, or below levels affecting beneficial uses because the resulting downstream DO levels in the creek are a complex function of creek and effluent DO levels, reaeration provided by the creek, temperature, photosynthetic activity, and benthic respiration rates, among other factors. Nevertheless, based on available data, the incremental increase in discharge rate is not expected to reduce downstream Putah Creek DO to levels that would adversely affect beneficial uses. Any incremental DO load that would potentially cause a "sag" in downstream DO concentrations would occur within Putah Creek, and thus would not affect the Delta due to full assimilation of the DO demand within Putah Creek and to continued downstream re-aeration, photosynthesis, etc.

Turbidity

The WWTP produces Title 22 quality, tertiary-treated effluent characterized by low turbidity levels, typically less than 1 Nephelometric Turbidity Unit (NTU), which is well below the turbidity levels found at Putah Creek Upstream as shown in Figure II. As such, the incremental increase in discharge from the WWTP would not cause increases in creek turbidity above that which currently occurs, and would not cause an exceedance of Basin Plan objectives for turbidity. Thus, the incremental increase in discharge would not result in a lowering of water quality with respect to turbidity.

Figure II: Effluent Turbidity verse Turbidity at R1 and R2

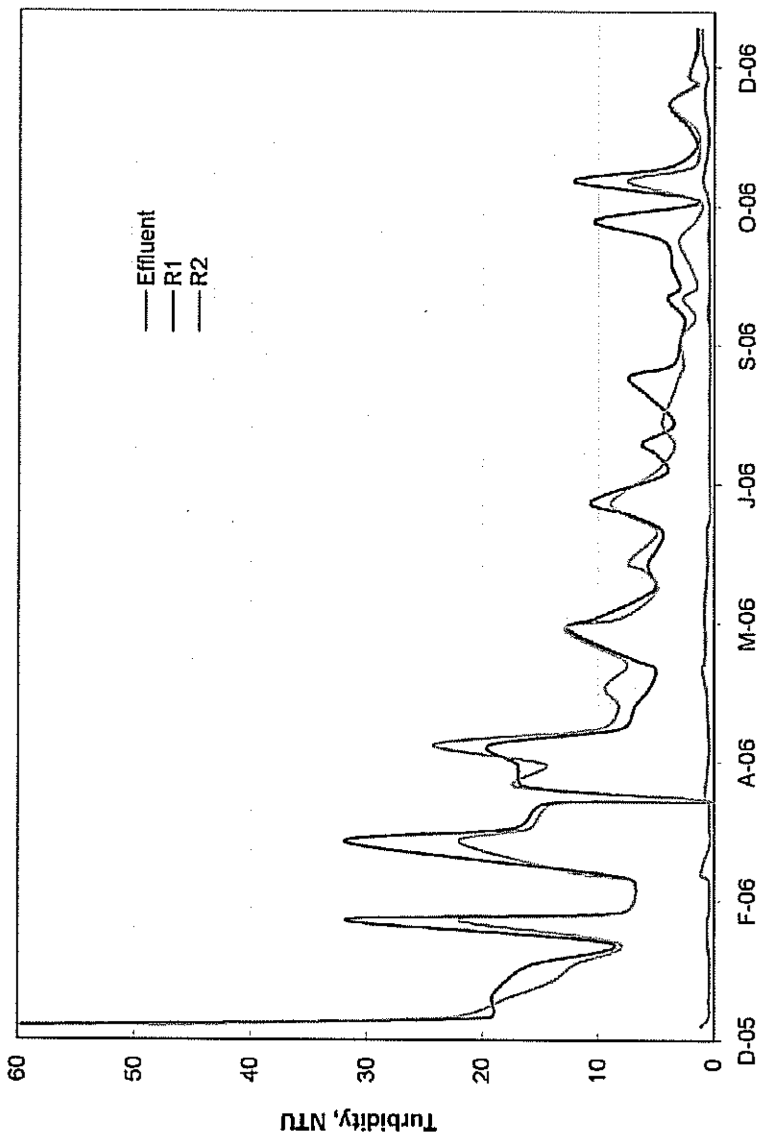

Figure II: Turbidity: Effluent verse Receiving Stream

Temperature
The temperature of Putah Creek downstream of the WWTP outfall is dependent on upstream creek and effluent discharge flow rates and temperatures. The Basin Plan's temperature objective states, *"At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F (2.8 °C) above natural receiving water temperature."*

Table 11 summarizes Putah Creek water temperatures upstream and downstream of the discharge, under historic operations. Temperatures (average, minimum and maximum) downstream of the outfall remain the same as those upstream. The available R1 and R2 temperature data predict thermal effects at levels that would not be expected to adversely affect downstream beneficial uses, including aquatic life uses.

Table 11. Putah Creek temperature upstream (R1) and downstream (R2) of the UC Davis Wastewater Treatment Plant outfall

Count	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Average (°C)												
R1 [1]	12.2	12.8	13.5	14.7	18.3	22.6	24.3	23.5	22.8	18.5	15.7	10.2
R2 [1]	12.5	12.8	12.5	14.2	18.6	22.5	24.4	22.9	22.2	19.4	15.8	10.1
Minimum (°C)												
R1 [1]	11.2	12.0	12.3	12.2	17.3	21.4	23.7	22.5	21.6	14.2	14.2	9.6
R2 [1]	12.1	12.0	11.2	12.5	17.8	21.6	24.2	22.4	20.8	16.8	14.7	9.1
Maximum (°C)												
R1 [1]	13.2	13.5	14.9	16.7	19.5	24.3	25.0	25.0	25.6	21.5	17.3	11.7
R2 [1]	13.1	14.1	13.8	17.7	19.7	23.3	24.6	23.9	23.9	21.2	17.0	11.5

[1] R1 and R2 data collected weekly from January 1, 2006 through December 27, 2006

With an incremental increase in discharge, temperatures downstream of the outfall could increase. However, based on the relatively similar temperature that have occurred historically and the future water temperature at R2 would be expected to have minor changes. No significant adverse thermal effects to aquatic life used would be expected to occur.

For all other constitutes addressed in Table 7, but not specifically addressed above, the resultant downstream constituent concentration/level changes would be minor following the incremental increase in discharge from 2.7 mgd to 3.6 mgd, and thus beneficial uses would be protected. In addition, a substantial amount of assimilative capacity would remain for each constituent.

7 SOCIOECONOMIC CONSIDERATIONS

7.1 Alternatives

Expansion of the WWTP from 2.7 mgd to 3.6 mgd cost approximately $8 million (August 2006). Construction began in December 2006 and it is expected to be finished by January 2008. As described in the project EIR documents (EDAW 2004, EDAW 2005), several alternatives were considered that would reduce or eliminate the lowering of water quality, for certain constituents, resulting from the additional 0.9 mgd of discharge capacity proposed with the plant expansion. These plant expansion alternatives were:

(1) No project – Holding Pond;
(2) Higher degree treatment using RO;
(3) Seasonal recycled Water Irrigation;
(4) Divert additional wastewater to the City of Davis Wastewater Treatment Plant; and
(5) Divert additional WWTP effluent to evaporation ponds;

Each alternative was assessed for feasibility in implementation and effectiveness in reducing the lowering of water quality. These alternatives were not selected because they would not meet basic project objectives, and/or or were determined to be infeasible for technological, environmental and economic reasons.

No Project – No Build

Under the No Project – No Build alternative, UC Davis would continue to use the existing WWTP and maintain the plant with normal repairs. The campus would make no modifications to the campus sanitary sewer system, including no expansion of plant capacity. If the campus sanitary sewer system were not expanded to meet the anticipated future campus wastewater demands, the campus would not be able to adequately convey and treat wastewater. Flows would likely continue to increase because of the contribution of wastewater from additional facilities that are already completed or under construction. Inadequate wastewater treatment would lead to sewer backup issues on campus, hydraulic overloading of wastewater inflow to the WWTP, violations of the WWTP's wastewater discharge requirements, and potential adverse water quality effects in Putah Creek through the discharge of partially treated wastewater. Alternatively, occupancy of new facilities that are under construction may be restricted, or planned projects may be withheld from construction because of inadequate sewage treatment capacity. This alternative is infeasible because it would not meet any of the project objectives, would result in insufficient wastewater treatment capacity, and could result in exceedances of regulatory water quality discharge limits.

Higher Degree of Treatment

This alternative would involve upgrades the existing WWTP facilities to provide additional wastewater treatment improvements and further reduce the concentrations of wastes in WWTP effluent. Because the existing WWTP produces high quality tertiary-treated effluent, alternatives for treatment were limited to those specific measures that would substantially reduce treated wastewater pollutants that are associated with potential environmental impacts. Reverse osmosis (RO) treatment technology can reduce total dissolved solids (TDS) or EC and other contaminants in municipal wastewater and could be used to further reduce the concentrations of wastes in WWTP effluent. However, the development of RO technology for the campus WWTP is considered infeasible because of the much higher costs and indirect environmental impacts associated with brine waste disposal. Additional costs associated with the construction of an RO system that produces effluent that meets the NPDES permit limit are estimated at roughly $5.3 million dollars. The long-term operation and maintenance needs, such as periodic membrane replacement, also result in substantially higher operational costs, estimated to be $380,000 annually for RO systems compared to conventional systems. In addition, the high-capacity and hi-pressure pumping systems require much larger quantities of energy than conventional wastewater treatment methods.

Seasonal Recycled Water Irrigation

Under this alternative, in addition to expansion of WWTP facilities, the campus would reuse treated effluent (recycled water) from the campus WWTP to somewhat reduce discharge to Putah Creek during the dry season. In addition to the WWTP expansion, this alternative would consist of constructing recycled water conveyance pipelines on campus and using recycled water for the irrigation of agricultural crops or urban landscaping during the growing season. The advantage of recycled water reuse is the incremental reduction of WWTP effluent discharge into Putah Creek, primarily during the summer peak growing season when demand for irrigation water is at the seasonally highest level and flows in the creek are typically approaching their lowest level.. During the winter months, irrigation demand for and, therefore, use of recycled water would be negligible, and the discharge to Putah Creek would be similar to the phase I expansion. Use of recycled water also reduces the demand, and thus conserves other domestic and agricultural water supplies that would otherwise be used for irrigation. The potential disadvantages of recycled water reuse include the substantial costs for infrastructure development coupled with the long-term commitment to using irrigation areas once they are established and, in this case, only limited reduction in discharges to Putah Creek during the irrigation season.

Though this alternative was not selected in place of the proposed expansion, seasonal recycled water irrigation is the most environmentally sound alternative and the University will continue pursuing opportunities to increase use of recycling water on campus.

Divert Additional Wastewater to the City of Davis WWTP

This alternative would consist of diverting all future increased flows to the City of Davis wastewater pollution control plant (WPCP). The existing campus WWTP would continue to be used to treat up to 2.7 mgd on an average annual basis and peak hourly flow of 6.3 mgd. The campus would pump raw wastewater inflows that exceed the current UC Davis WWTP treatment capacity to the City of Davis' sanitary sewer system. Consequently, campus growth through 2013 would result in UC Davis conveying approximately 0.9 mgd ADWF (i.e., 2.7 mgd to 3.6 mgd) and additional peak flows of this alternative is the elimination of additional discharges to Putah Creek and thereby elimination of the impacts associated with future exceedances of

NPDES permit limits for this incremental wastewater, and reduction of less-than-significant project-related water quality and aquatic resources effects associated with the effluent discharge to Putah Creek.

The potential disadvantages of diverting all wastewater to the City WPCP include the substantial costs for infrastructure development and the possibility that the project objective to eliminate the RWQCB compliance issue associated with effluent EC, total, suspended solids, ammonia reduction for toxicity and some effluent limitations for organics and metals. The Regional Water Quality Control Board has indentified that the city WWTP effluent has the reasonable potential to cause, or contribute to an excursion above the State narrative criteria for water quality for electrical conductivity (EC). As a result, a final EC effluent limitation that is derived from, and complies with, the applicable water quality standard is needed to meet the requirements (Tentative Waste Discharge Requirements for City of Davis NPDES No. CA0079049). The city of Davis uses shallower wells in comparison to UC Davis' deep well as their water source, which contains higher TDS than from deep well. So, that average EC concentrations in WPCP effluent are higher than that from UC Davis WWTP effluent. By diverting additional wastewater to the city of Davis, it would create additional EC problem for the City. In addition, the campus would need to upgrade the existing central campus headworks to serve as a pumping station and construct a pipeline from the campus headworks to the City's wastewater system. The City's WPCP is located approximately six miles northeast of the campus. The City's sewer lines do not provide sufficient capacity to accommodate in additional wastewater from the campus. Therefore, a separate sewer main line would need to be constructed to convey flow to the City's WPCP. It is estimated that the campus would need to construct an estimated 9 miles of pipeline to connect the campus to the City's treatment plant.

Divert Additional Effluent to Evaporation Ponds

This alternative would consist of diverting the future increased WWTP effluent in excess of the existing permitted design capacity of 2.7 mgd to evaporation ponds. The alternative would include construction of facilities (plant upgrades, pump station upgrades) included in the proposed project to upgrade facilities to a design capacity of 3.6 mgd ADWF. Consequently, campus growth through 2013 would result in UC Davis treating approximately 0.9 mgd of additional ADWF flows, as well as additional peak flows by 2013 to meet in the projected growth. The evaporation ponds would be lined and 440 to 550 acres of ponds would be required to accommodate this disposal method for the 0.9 mgd ADWF flow rate. This amount of land could not be found in a contiguous parcel on campus in the vicinity of the WWTP, so off campus lands located within about 1 mile of the WWTP (to eliminate the need for extensive pipelines) would need to be acquired.

7.2 Benefits of Increased Discharge

In order to meet the University's mission of teaching, research, and public service, UC Davis has grown significantly in recent years. Many new buildings have been constructed since the WWTP was brought on line in 2000 (e.g., Plant Environmental Sciences, Modavi Center, Genomics & Biomedical Science Facilities, Watershed Sciences Laboratory, Segundo North Dormitories, Tercero Dormitory Expansion). The programs supported by growth at UC Davis are vital to the region, the state, with demonstrated world-wide benefits. Based on historical WWTP flows and load projections, several module units within the existing WWTP would exceed their design capacity by 2008. More importantly, the plant would be able to treat increasing demand on peak weather flow and comply with its discharge limits at all time. Historical wet-weather flows were higher than those initially assumed during the original WWTP construction, and the plant has occasionally experienced peak flows that exceeded its design capacity. If the proposed permit capacity expansion is approved by the RWQCB, UC Davis will be able to accommodate planned and approved growth for the campus through 2013.

8 ANTIDEGRADATION ANALYSIS FINDINGS

Primary findings in this analysis are that the loading of constituents in proposed discharge flow increases by the discharger produce minor effects that are not significant. The following is a summary of the key findings of this report.

Although the concentrations are still within Water Quality Objectives at the downstream Putah Creek of WWTP discharge, Table 5 indicates that selenium and electrical conductivity will have some incremental increase and the use of existing creek assimilative capacity due to the proposed discharge flow increase. The University is moving forward with the plans to address these constituents as a permit-compliance issue. Once permit compliance is achieved both constituents will be significantly reduced, and no impacts to the South Fork are anticipated.

1. The proposed action will or will not lower receiving water quality

Sections 6.1 through 6.3 detail the rationale for determining if any decrease water quality is predicted to occur. Based on the projected constituent concentrations at R2, increasing the WWTP discharge to Putah Creek from 2.7 mgd to 3.6 mgd would not result in lowered water quality at significance threshold for any constituents that could potentially become effluent limits. Many constituents, (e.g., bis(2-ethylhexyl)phthalate, ammonia, aluminum, chromium VI, iron, mercury and chromium) will decrease or remain unchanged as a result of the expansion.

The WWTP discharge does not currently meet the NPDES permit effluent limit of 900 µmhos/cm, but EC concentrations at Putah Creek downstream of the WWTP discharge indicate that it is seldom that the EC exceed the limit.

On a mass-loading evaluation, Selenium concentrations are predicted to increase and use 13.5% of the available capacity, but water quality objectives will still be met. Moreover, selenium concentrations will decrease significantly in concert with proposed actions to reduce effluent EC levels.

2. A description of the alternative control measures that were considered.

Several alternatives were considered that would reduce or eliminate the lowering of water quality resulting from the additional 0.9 mgd of discharge capacity proposed with the plant expansion. These plant expansion alternatives are listed below are described in detail in Section 7.1.

- No project – Holding Pond;
- Higher degree treatment using RO;
- Seasonal recycled Water Irrigation;
- Divert additional wastewater to the City of Davis Wastewater Treatment Plant; and
- Divert additional WWTP effluent to evaporation ponds;

In summary, the anticipated water quality changes in Putah Creek will be consistent with state and federal antidegradation policies, will be to the socioeconomic benefit to the people of the region, be to the maximum benefit of the people of the State, and will not result in water quality less than that prescribed in the policies, that required to prevent a nuisance, or that required to protect beneficial uses.

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APPENDIX I. Putah Creek Stream Flows at I-80, in Cubic Feet Per Second (cfs)

Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
1/11/2002		31	19	
1/14/2002		28	19	
1/18/2002		31	19	
1/19/2002		31	19	
1/20/2002		30	19	
1/21/2002		30	19	
1/22/2002		30	19	
1/23/2002		29	19	
1/24/2002		29	19	30
1/25/2002		29	19	30
1/26/2002		32	19	30
1/27/2002		31	19	30
1/28/2002		32	19	30
1/29/2002		32	19	31
1/30/2002		30	19	31
1/31/2002		30	19	31
2/1/2002		31	19	31
2/2/2002		28	19	31
2/3/2002		24	19	30
2/4/2002		23	19	28
2/5/2002		23	19	27
2/6/2002		23	19	26
2/7/2002		24	19	25
2/8/2002		25	19	24
2/9/2002		24	19	24
2/10/2002		24	19	24
2/11/2002		24	19	24
2/12/2002		24	19	24
2/13/2002		24	19	24
2/14/2002		24	19	24
2/15/2002		24	19	24
2/16/2002		24	19	24
2/17/2002		25	19	24
2/18/2002		23	19	24
2/19/2002		23	19	24
2/20/2002		23	19	24
2/21/2002		22	19	23
2/22/2002		22	19	23
2/23/2002		22	19	23
2/24/2002		21	19	22
2/25/2002		21	19	22
2/26/2002		21	19	22
2/27/2002		22	19	22
2/28/2002		22	19	22
3/1/2002		22	25	22
3/2/2002		27	25	22
3/3/2002		30	25	24
3/4/2002		26	25	24
3/5/2002		27	25	25
3/6/2002		29	25	26
3/7/2002		29	25	27
3/8/2002		27	25	28
3/9/2002		27	25	28
3/10/2002		28	25	28
3/11/2002		27	25	28

3/12/2002		27	25	28
Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
3/13/2002		26	25	27
3/14/2002		27	25	27
3/15/2002		28	25	27
3/16/2002		29	25	27
3/17/2002		29	25	28
3/18/2002		32	25	28
3/19/2002		30	25	29
3/20/2002		31	25	29
3/21/2002		32	25	30
3/22/2002		34	25	31
3/23/2002		39	25	32
3/24/2002		36	25	33
3/25/2002		34	25	34
3/26/2002		34	25	34
3/27/2002		33	25	35
3/28/2002		33	25	35
3/29/2002		53	25	37
3/30/2002		172	25	56
3/31/2002		90	25	64
4/1/2002		79	50	71
4/2/2002		58	50	74
4/3/2002		54	50	77
4/4/2002		54	50	80
4/5/2002		53	50	80
4/6/2002		53	50	63
4/7/2002		53	50	58
4/8/2002		53	50	54
4/9/2002		54	50	53
4/10/2002		55	50	54
4/11/2002		56	50	54
4/12/2002		56	50	54
4/13/2002		57	50	55
4/14/2002		59	50	56
4/15/2002		61	50	57
4/16/2002		57	50	57
4/17/2002		59	50	58
4/18/2002		60	50	58
4/19/2002		56	50	58
4/20/2002		55	50	58
4/21/2002		55	50	58
4/22/2002		53	50	56
4/23/2002		52	50	56
4/24/2002		52	50	55
4/25/2002		52	50	54
4/26/2002		52	50	53
4/27/2002		49	50	52
4/28/2002		48	50	51
4/29/2002		50	50	51
4/30/2002		57	50	51
5/1/2002		51	20	51
5/2/2002		45	20	50
5/3/2002		44	20	49
5/4/2002		42	20	48
5/5/2002		41	20	47
5/6/2002		40	20	46
5/7/2002		41	20	43

5/8/2002		49	20	43
5/9/2002		46	20	43
Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
5/10/2002		42	20	43
5/11/2002		43	20	43
5/12/2002		42	20	43
5/13/2002		40	20	43
5/14/2002		38	20	43
5/15/2002		38	20	41
5/16/2002		36	20	40
5/17/2002		36	20	39
5/18/2002		40	20	39
5/19/2002		46	20	39
5/20/2002		49	20	40
5/21/2002		48	20	42
5/22/2002		43	20	43
5/23/2002		36	20	43
5/24/2002		29	20	42
5/25/2002		30	20	40
5/26/2002		34	20	38
5/27/2002		34	20	36
5/28/2002		35	20	34
5/29/2002		36	20	33
5/30/2002		34	20	33
5/31/2002		37	20	34
6/1/2002		38	15	35
6/2/2002		33	15	35
6/3/2002		32	15	35
6/4/2002		31	15	34
6/5/2002		29	15	33
6/6/2002		29	15	33
6/7/2002		28	15	31
6/8/2002		30	15	30
6/9/2002		33	15	30
6/10/2001		35	15	31
6/11/2002		30	15	31
6/12/2002		31	15	31
6/13/2002		33	15	31
6/14/2002		32	15	32
6/15/2002		31	15	32
6/16/2002		31	15	32
6/17/2002		33	15	32
6/18/2002		29	15	31
6/19/2002		24	15	30
6/20/2002		26	15	29
6/21/2002		30	15	29
6/22/2002		29	15	29
6/23/2002		31	15	29
6/24/2002		28	15	28
6/25/2002		28	15	28
6/26/2002		27	15	28
6/27/2002		26	15	28
6/28/2002		24	15	28
6/29/2002		20	15	26
6/30/2002		16	15	24
7/1/2002		18	15	23
7/2/2002		22	15	22
7/3/2002		28	15	22

Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
7/4/2002		24	15	22
7/5/2002		18	15	21
7/6/2002		19	15	21
7/7/2002		26	15	22
7/8/2002		27	15	23
7/9/2002		24	15	24
7/10/2002		20	15	23
7/11/2002		21	15	22
7/12/2002		23	15	23
7/13/2002		20	15	23
7/14/2002		18	15	22
7/15/2002		18	15	21
7/16/2002		26	15	21
7/17/2002		24	15	21
7/18/2002		25	15	22
7/19/2002		26	15	22
7/20/2002		23	15	23
7/20/2002		21	15	23
7/21/2002		21	15	24
7/22/2002		21	15	23
7/23/2002		25	15	23
7/24/2002		35	15	25
7/25/2002		34	15	26
7/26/2002		28	15	26
7/27/2002		25	15	27
7/28/2002		24	15	27
7/29/2002		25	15	28
7/30/2002		27	15	28
7/31/2002		25	15	27
8/1/2002		23	10	25
8/2/2002		27	10	25
8/3/2002		29	10	26
8/4/2002		25	10	26
8/5/2002		18	10	25
8/6/2002		20	10	24
8/7/2002		21	10	23
8/8/2002		21	10	23
8/9/2002		20	10	22
8/10/2002		17	10	20
8/11/2002		22	10	20
8/12/2002		23	10	21
8/13/2002		20	10	21
8/14/2002		18	10	20
8/15/2002		21	10	20
8/16/2002		17	10	20
8/17/2002		17	10	20
8/18/2002		26	10	20
8/19/2002		32	10	22
8/20/2002		29	10	23
8/21/2002		26	10	24
8/22/2002		20	10	24
8/23/2002		23	10	25
8/24/2002		17	10	25
8/25/2002		23	10	24
8/26/2002		21	10	23
8/27/2002		21	10	22
8/28/2002		21	10	21

8/29/2002		20	10	21
8/30/2002		22	10	21
8/31/2002		24	10	22
9/1/2002		33	5	23
Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
9/2/2002		25	5	24
9/3/2002		11	5	22
9/4/2002		8	5	20
9/5/2002		8	5	19
9/6/2002		10	5	17
9/7/2002		12	5	15
9/8/2002		12	5	12
9/9/2002		12	5	10
9/10/2002		13	5	11
9/11/2002		11	5	11
9/12/2002		11	5	12
9/13/2002		12	5	12
9/14/2002		9	5	11
9/15/2002		12	5	11
9/16/2002		9	5	11
9/17/2002		10	5	11
9/18/2002		9	5	10
9/19/1992		13	5	11
9/20/2002		12	5	11
9/21/2002		13	5	11
9/22/2002		14	5	11
9/23/2002		14	5	12
9/24/2002		9	5	12
9/25/2002		7	5	12
9/26/2002		7	5	11
9/27/2002		7	5	10
9/28/2002		6	5	9
9/29/2002		6	5	8
9/30/2002		6	5	7
10/1/2002		8	5	7
10/2/2002		7	5	7
10/3/2002		6	5	7
10/4/2002		3	5	6
10/5/2002		3	5	6
10/6/2002		6	5	6
10/7/2002		9	5	6
10/8/2002		8	5	6
10/9/2002		7	5	6
10/10/2002		7	5	6
10/11/2002		7	5	7
10/12/2002		6	5	7
10/13/2002		6	5	7
10/14/2002		7	5	7
10/15/2002		7	5	7
10/16/2002		6	5	7
10/17/2002		6	5	6
10/18/2002		7	5	6
10/19/2002		7	5	7
10/20/2002		8	5	7
10/21/2002		9	5	7
10/22/2002		9	5	7
10/23/2002		8	5	8
10/24/2002		9	5	8

10/25/2002		9	5	8
10/26/2002		9	5	9
10/27/2002		9	5	9
10/28/2002		9	5	9
10/29/2002		9	5	9
Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
10/30/2002		11	5	9
10/31/2002		11	5	10
11/1/2002		11	10	10
11/2/2002		14	10	11
11/3/2002		14	10	11
11/4/2002		14	10	12
11/5/2002		14	10	13
11/6/2002		13	10	13
11/7/2002		26	10	15
11/8/2002		90	10	26
11/9/2002		34	10	29
11/10/2002		54	10	35
11/11/2002		50	50	40
11/12/2002		53	10	46
11/13/2002		57	50	52
11/14/2002		53	50	56
11/15/2002		52	50	50
11/16/2002		31	5	50
11/17/2002		29	5	46
11/18/2002		26	5	43
11/19/2002		24	5	39
11/20/2002		25	5	34
11/21/2002		34	5	32
11/22/2002		37	5	29
11/23/2002		33	5	30
11/24/2002		31	5	30
11/25/2002		29	5	30
11/26/2002		24	19	30
11/27/2002		23	19	30
11/28/2002		25	19	29
11/29/2002		19	19	26
11/30/2002		20	19	24
12/1/2002		20	19	23
12/2/2002		21	19	22
12/3/2002		21	19	21
12/4/2002		19	19	21
12/5/2002		20	19	20
12/6/2002		21	19	20
12/7/2002		21	19	20
12/8/2002		18	19	20
12/9/2002		21	19	20
12/10/2002		21	19	20
12/11/2002		19	19	20
12/12/2002		28	19	21
12/13/2002		100	19	33
12/14/2002		100	19	44
1/13/2003		41	19	47
1/14/2003		36	19	49
1/15/2003		35	19	51
1/16/2003		34	19	53
1/17/2003		34	19	54
1/18/2003		34	19	45

1/19/2003		34	19	35
1/20/2003		34	19	34
1/21/2003		34	19	34
1/22/2003		34	19	34
1/23/2003		34	19	34
1/24/2003		34	19	34
Date		Mean Daily (cfs)	Minimum Required Flow under Agreement	7-Day Running Average
1/25/2003		34	19	34
1/26/2003		33	19	34
1/27/2003		32	19	34
1/28/2003		32	19	33
1/29/2003		33	19	33
1/30/2003		33	19	33
1/31/2003		33	19	33
2/1/2003		33	19	33
2/2/2003		32	19	33
2/3/2003		28	19	32
2/4/2003		28	19	31
2/5/2003		29	19	31
2/6/2003		32	19	31
2/7/2003		25	19	30
2/8/2003		24	19	28
2/9/2003		25	19	27
2/10/2003		26	19	27
2/11/2003		26	19	27
2/12/2003		26	19	26
2/13/2003		29	19	26
2/14/2003		26	19	26
2/15/2003		25	19	26
2/16/2007		200	19	51
2/17/2003		200	19	76
2/18/2003		200	19	101
2/19/2003		200	19	126
2/20/2003		200	19	150
2/21/2003		200	19	175
2/22/2003		200	19	200
2/23/2003		200	19	200
2/24/2003		200	19	200
2/25/2003		200	19	200
2/26/2003		200	19	200
2/27/2003		200	19	200
2/28/2003		200	19	200
3/1/2003		200	19	200
3/2/2003		200	19	200
3/3/2003		200	19	200
3/5/2003		37	25	177
3/6/2003		36	25	153
3/7/2003		35	25	130
3/8/2003		35	25	106

Average	**32**
Maximum	**200**
Minimum	**3**
1Q1=	**3**
7Q1=	**6**

Exhibit "E-1"

Solano Project Releases and Instream Flows for Lower Putah Creek

A. Rearing Flows ((1), (2) & (3) all shall be maintained)

(1) Permittee shall, for each month as set forth below, maintain mean daily releases from the Putah Diversion Dam to Creek downstream of the Putah Diversion Dam (hereinafter "lower Putah Creek") that are equal to or in excess of the following rates, expressed in cubic feet per second ("cfs"):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Release (cfs)	20	25	25	25	16	26	46	43	43	43	34	20

These mean daily releases shall be measured at the Putah Diversion Dam and made from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam. The instantaneous releases at the Putah Diversion Dam shall at all times equal or exceed ninety percent (90%) of the applicable mean daily release requirement.

(2) Permittee shall, for each month as set forth below, release sufficient water from the Putah Diversion Dam into lower Putah Creek immediately downstream of the Putah Diversion Dam to maintain mean daily flows in lower Putah Creek that are equal to or in excess of the following rates, expressed in cubic feet per second ("cfs"):

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean Daily Flows (cfs)	5	10	10	15	15	25	30	20	15	15	10	5

These mean daily flows shall be maintained and measured at or in the near vicinity of the Interstate 80 Bridge. The instantaneous flow at the Interstate 80 Bridge shall at all times equal or exceed ninety percent (90%) of the applicable mean daily flow requirement.

(3) Permittee shall at all times of the year release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a continuous flow of surface water in Putah Creek from the Old Davis Road Bridge to the western boundary of the Yolo Bypass, identified as River Mile 0.0 on trial exhibit number 41 in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565.

B. Spawning Flows ((1), (2) & (3) all shall be maintained)

(1) At a time between February 15 and March 31 of every calendar year, Permittee shall release a three-consecutive-day pulse of water from the Putah Diversion Dam into lower Putah Creek equal to or in excess of the following rates:

(a) 150 cfs for the first 24 hours;

(b) 100 cfs for the second 24 hours; and

(c) 80 cfs for the third 24 hours.

Permittee may, in its discretion, time this pulse so as to utilize any uncontrolled flows that may provide some or all of the water needed to comply with this requirement.

(2) In every year, for the 30 days that follow the three-day pulse release described in paragraph B.(1), Permittee shall release sufficient water from the Putah Diversion Dam into lower Putah Creek to maintain a mean daily flow equal to or in excess of 50 cfs at the Interstate 80 Bridge. During this period, the instantaneous flows at the Interstate 80 Bridge shall at all times equal or exceed 45 cfs.

(3) In every year, at the conclusion of the 30th day of the 50 cfs spawning flows described in subsection B.(2), Permittee then shall ramp down the controlled releases from the Putah Diversion Dam gradually over a seven-day period until the flows are in compliance with the applicable requirements set forth in subsections A.(2), A.(3), C.(3) and C.(4) of this Exhibit "E-1".

C. Supplemental Flows ((1), (2), (3) & (4) all shall be maintained

The requirements set forth thus far herein are intended to protect the aquatic and related resources found in lower Putah Creek. In addition to maintaining these resources, Permittee shall provide supplemental flows in an attempt to enhance the aquatic and related resources of lower Putah Creek above that baseline. Accordingly:

(1) Permittee shall, during the period from November 1 through December 15 of each calendar year, release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the Toe Drain on the eastern side of the Yolo Bypass (the "East Toe Drain").

(2) Beginning sometime between November 15 and December 15 of each calendar year, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 50 cfs, and an instantaneous flow of at least 45 cfs, for five consecutive days at the point where Putah Creek discharges into the East Toe Drain. If a flash board dam is present on Putah Creek near the East Toe Drain during that period, and if the flash boards are removed during that period, then to the extent feasible the first day of the 50 cfs pulse flow at the East Toe Drain shall follow the removal of the flash boards. The precise timing of the initiation of the 50 cfs pulse flow shall be set each year by the Lower Putah Creek Coordinating Committee (the "LPCCC") established in accordance with section III of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565. The objective of the LPCCC shall be to time the release so as to maximize the potential for such flows to attract anadromous fish into Putah Creek. If the exact date of releases has not been established or agreed upon by the LPCCC, then the releases dealt with in this subparagraph shall commence on December 1 of the affected calendar year.

(3) Beginning on the sixth day after initiation of the above described 50 cfs pulse flow, and continuing each day thereafter through March 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 19 cfs, and an instantaneous flow of at least 14 cfs, at I-80.

(4) Beginning on April 1 of each calendar year, and continuing each day thereafter through May 31, Permittee shall release sufficient water from Putah Diversion Dam to lower Putah Creek to maintain a mean daily flow of at least 5 cfs, and an instantaneous flow of at least 2 cfs, at the point where Putah Creek discharges into the East Toe Drain.

D. Drought Year Flows

(1) During years when total storage in Lake Berryessa is less than 750,000 acre feet ("af") as of April 1 (a "Drought Year"), the release and instream flow requirements set forth in sections D.(2), D.(3) and D.(4) below ("Drought Year Requirements") shall apply instead of the release and instream flow requirements set forth in sections A., B. and C. above ("Non-Drought Year Requirements"). Provided, however, that if after April 1 the total storage in Lake Berryessa rises to 750,000 af or more, then the Non-Drought Year Requirements shall immediately take effect.

(2) During a Drought Year, releases of water from the Putah Diversion Dam into lower Putah Creek shall equal or exceed the following amounts (mean daily values, in cfs, with instantaneous releases always equal to or exceeding 90 % of the listed values):

Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma	Jun	Jul	Aug	Sep
15	25	25	25	16	26	46	33	33	33	26	15

(3) During a Drought Year, Permittee shall release sufficient water from the Putah Diversion Dam to maintain a continuous flow of surface water in Putah Creek from Putah

Diversion Dam to the Interstate 80 Bridge, and further shall release sufficient water from the Putah Diversion Dam to maintain a minimum mean daily instream flow of 2 cfs at the Interstate 80 Bridge, with instantaneous flows always equal to or exceeding 1 cfs. Under these conditions, Permittee shall not be required to maintain a continuous flow of surface water in the reach of Putah Creek below the Interstate 80 Bridge.

(4) Whenever the release and instream flow requirements set forth in sections D.(2) and D.(3) are in effect for two consecutive years, then during the next year thereafter the Non-Drought Year Requirements shall apply and shall remain in effect for an entire period from April 1 through March 31, unless total storage in Lake Berryessa on April 1 is less than 400,000 af. If the Drought Year Requirements are ever in effect for three or more consecutive years, then the Non-Drought Year Requirements shall apply and remain in effect for an entire period from April 1 through March 31 in the first subsequent year during which total storage in Lake Berryessa on April 1 exceeds 400,000 af.

(5) For the purposes of this section D, "total storage in Lake Berryessa" shall be the actual amount of water that physically is stored in Lake Berryessa (including all carryover storage) plus a Storage Adjustment. As of the date of entry of this Amended Judgment, the Storage Adjustment shall be zero. Thereafter, the amount of any controlled release of water from Lake Berryessa that is not for the purpose of (i) Solano Project Diversions, or (ii) maintaining the flows in lower Putah Creek that are required by this Amended Judgment shall be added to the Storage Adjustment. When Lake Berryessa spills, and all carryover storage has been spilled or otherwise eliminated, the Storage Adjustment shall be re-set to zero. The Storage Adjustment shall never be less than zero. "Solano Project Diversions," for the purpose of this paragraph, means water delivered to Solano Project Participating Agencies and Putah South Canal Conveyance losses (Canal inflows minus deliveries from canals).

(6) If Solano Project Water that is not within the scope of Solano Project Contract Allocations, as is defined in Section IV of the Amended Judgments in the *Putah Creek Water Cases*, Judicial Council Coordination Proceeding No. 2565, ever is stored in an offstream reservoir or reservoirs or underground storage, and, as a result, Lake Berryessa storage levels are reduced below the levels that would occur in the absence of such storage, then the 750,000 af amount in paragraph D.(1) and the 400,000 af amount in paragraph D.(4) shall be adjusted so that Drought Year Requirements will continue to occur at the same frequencies as they would have occurred in the absence of such storage.

E. Illegal Diversion Account

If there is any risk that illegal diversions may take place from lower Putah Creek to a degree that water released by the Solano Project for the purposes of maintaining the minimum flows set forth herein will be significantly depleted, then the procedures set forth in the attached Exhibit "E-2" shall be implemented.

F. Monitoring Requirements ((1), (2), (3) & (4) all shall be satisfied)

(1) Permittee shall continuously measure and record releases from the Putah Diversion Dam to lower Putah Creek, and shall determine and record each day's mean daily release.

(2) Permittee shall forthwith install and maintain flow measurement gauges capable of measuring instream flows on a continuous basis at the Interstate 80 Bridge and near the East Toe Drain. Permittee shall collect and maintain the data recorded by each of these gauges as is necessary to demonstrate their compliance with the flow requirements imposed by this Amended Judgment. In addition, Permittee shall make regular measurements of instream flows at Stevenson Road Bridge, Pedrick Road Bridge and Old Davis Road Bridge. If the instream flow measured at Stevenson Road Bridge, Pedrick Road Bridge, or at Old Davis Road Bridge, is less than the minimum instream flow requirements in section A.(2) above on more than an infrequent basis, then the paragraph A.(2) flow

requirements shall start to apply at such measurement point or points, in addition to still applying at the Interstate 80 Bridge. Permittee shall install, maintain, repair, calibrate and operate gauging equipment at such compliance points as may be necessary to ensure and demonstrate their compliance with the provisions of this Exhibit "A". Gaging equipment shall be installed to provide a range of measurement from 0 cfs to at least 200 cfs.

(3) Permittee shall monitor flows in the entire reach of lower Putah Creek from Old Davis Road Bridge to River Mile 0.0 with sufficient frequency and by sufficient means to ensure compliance with the requirement in part A.(3) of this Amended Judgment that continuous flow of surface water be maintained in this reach at all times of the year. All measurements and observations of this reach made for purposes of compliance with this requirement shall be recorded.

(4) Permittee shall maintain records, in both paper and electronic format, of all release and flow measurements, all calculated mean daily releases and flows, and all observations required by this Judgment. Promptly upon request, these records shall be made available for review and copying by any person during normal business hours at the offices of Permittee or its designee.

APPENDIX III

UC Davis Wastewater Treatment Plant Effluent Quality Summary

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
1,1,1-Trichloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
1,1,2,2-Tetrachloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	10
1,1,2-Trichloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,1-Dichlororethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
1,1-Dichlororethene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,2,3,4,6,7,8-HeptaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1.18
1,2,3,4,6,7,8-HeptaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.516
1,2,3,4,7,8,9-HeptaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.654
1,2,3,4,7,8-HexaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.845
1,2,3,4,7,8-HexaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.545
1,2,3,6,7,8-HexaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1.05
1,2,3,6,7,8-HexaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.355
1,2,3,7,8,9-HexaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.91
1,2,3,7,8,9-HexaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.37
1,2,3,7,8-PentaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.771
1,2,3,7,8-PentaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1.05
1,2,4-Trichlorobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	5
1,2-Benzanthracene (Perylene)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
1,2-Dibromo-3-chloropropane (DBCP)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
1,2-Dichlorobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
1,2-Dichloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,2-Dichloropropane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,2-Diphenylhydrazine (Azobenzene)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
1,3-Dichlorobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
1,3-Dichloropropene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
1,4-Dichlorobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
2- Chloroethyl vinyl ether	ug/l	3/10/2004	1/11/2007	8	0	0%	ND	ND	1
2,3,4,6,7,8-HexaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.476
2,3,4,7,8-PentaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1.08
2,3,7,8-TCDD (Dioxin)	ug/l	3/10/2004	1/9/2007	7	0	0%	ND	ND	5.00E-06
2,3,7,8TetraCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.543
2,3,7,8-TetraCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.449
2,4,5-TP (Silvex)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
2,4,6-Trichlorophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
2,4-D	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	10
2,4-Dichlorophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05

APPENDIX III

UC Davis Wastewater Treatment Plant Effluent Quality Summary

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
2,4-Dimethylphenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
2,4-Dinitrophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.2
2,4-Dinitrotoluene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
2,6-Dinitrotoluene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
2-Chloronaphthalene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
2-Chlorophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
2-Nitrophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
3,3'-Dichlorobenzidine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
3,4-Benzofluoranthene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
4,4'-DDD	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
4,4'-DDE	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
4,4'-DDT	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
4,6-Dinitro-2-methylphenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
4-Bromophenyl phenyl ether	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
4-Chloro-3-methylphenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
4-Chlorophenyl phenyl ether	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
4-Nitrophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Acenaphthene	ug/l	3/10/2004	1/11/2007	11	1	9%	0.00197	0.005	0.001
Acenaphthylene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Acrolein	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	5
Acrylonitrile	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Alachlor	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Aldrin	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
alpha-Endosulfan	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.005
alpha-Hexachlorocyclohexane (BHC)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Aluminum	ug/l	1/1/2004	1/11/2007	41	27	66%	25.0	80.4	20
Ammonia (as N)	ug/l	1/1/2004	1/11/2007	41	1	2%	ND	0.56	0.5
Anthracene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Antimony	ug/l	3/10/2004	1/11/2007	10	0	0%	ND	ND	0.5
Arsenic	ug/l	3/10/2004	1/11/2007	11	11	100%	4.59	6.53	0.5
Asbestos	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	
Atrazine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
Barium	ug/l	3/10/2004	1/11/2007	11	11	100%	57.9	80	0.5
Bentazon	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Benzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Benzidine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
Benzo(a)pyrene (3,4-Benzopyrene)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
Benzo(g,h,l)perylene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Benzo(k)fluoranthene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Beryllium	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
beta-Endosulfan	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.005
beta-Hexachlorocyclohexane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Bis(2-chloroethoxy)methane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.2
Bis(2-chloroethyl)ether	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Bis(2-chloroisopropyl)ether	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Bis(2-ethylhexyl)phthalate	ug/l	3/10/2004	1/11/2007	11	10	91%	0.639	1.7485	0.005
Bromoform	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Bromomethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Butyl benzyl phthalate	ug/l	3/10/2004	1/11/2007	11	6	55%	0.0316	0.1174	0.005
Cadmium	ug/l	3/10/2004	1/11/2007	11	5	45%	0.289	0.69	0.1
Carbfuran	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	5
Carbon Tetrachloride	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Chlordane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Chloride	mg/l	3/10/2004	1/11/2007	11	11	100%	149	195.36	10
Chlorobenzene (mono chlorobenzene)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Chloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Chloroform	ug/l	3/10/2004	1/11/2007	11	1	9%	0.405	2.2	0.5
Chloromethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Chlorpyifos	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
Chromium	ug/l	3/10/2004	1/11/2007	11	11	100%	4.65	7.75	0.5
Chromium VI	ug/l	3/10/2004	1/11/2007	11	1	9%	0.00605	0.05	0.005
Chrysene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
cis-1,2-Dichloroethene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Copper	ug/l	1/1/2004	1/11/2007	35	12	34%	2.50	6.5	5
Cyanide	ug/l	1/1/2004	1/11/2007	41	0	0%	ND	ND	5.0
Dalapon	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	10
delta-Hexachlorocyclohexane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Di(2-ethylhexyl)adipate	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	3
Diazinon	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
Diazinon	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.25
Dibenzo(a,h)-anthracene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Dibromochloromethene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Dichlorobromomethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5

APPENDIX III

UC Davis Wastewater Treatment Plant Effluent Quality Summary

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
Dichloromethane (methylene chloride)	ug/l	3/10/2004	1/11/2007	15	1	7%	0.833	2	2
Dieldrin	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Diethyl phthalate	ug/l	3/10/2004	1/11/2007	11	10	91%	0.0521	0.128	0.005
Dimethyl phthalate	ug/l	3/10/2004	1/11/2007	11	1	9%	0.00913	0.0479	0.005
Di-n-butylphthalate	ug/l	3/10/2004	1/11/2007	11	10	91%	0.0428	0.0903	0.005
Di-n-octylphthalate	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
Dinoseb	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Diquat	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	4
Endosulfan sulfate	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Endothal	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	45
Endrin	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.005
Endrin Aldehyde	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
Ethylbenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Ethylene Dibromide	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.02
Fluoranthene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Fluorene	ug/l	3/10/2004	1/11/2007	11	1	9%	0.00333	0.0177	0.001
Fluoride	ug/l	3/10/2004	1/11/2007	11	10	91%	0.231	0.32	0.01
Foaming Agents (MBAS)	mg/l	3/10/2004	1/11/2007	11	11	100%	0.130	0.9	0.005
Glyphosate	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	25
Hardness (as CaCO3)	mg/l	1/1/2004	1/11/2007	41	41	100%	210	290	1
Heptachlor	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Heptachlor Epoxide	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Hexachlorobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Hexachlorobutadiene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
Hexachlorocyclopentadiene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
Hexachloroethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
Indeno(1,2,3-c,d)pyrene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Iron	ug/l	1/1/2004	1/11/2007	41	33	80%	36.7	145	20
Isophorone	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Lead	ug/l	1/1/2004	1/11/2007	41	8	20%	0.978	2.5	2.5
Lindane (gamma-Hexachlorocyclohexane)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.002
Manganese	ug/l	3/10/2004	1/11/2007	11	10	91%	1.14	3	0.5
Mercury	ug/l	3/10/2004	1/11/2007	11	10	91%	0.00225	0.0093	0.00002
Methoxychlor	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	10
Molinate (Ordram)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Monomethyl Mercury	ug/l	3/10/2004	7/31/2005	12	9	75%	0.000147	0.00133	
MTBE	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	3

APPENDIX III

UC Davis Wastewater Treatment Plant Effluent Quality Summary

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
Naphthalene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	10
Nickel	ug/l	3/10/2004	1/11/2007	11	11	100%	1.09	1.54	0.5
Nitrate (as N)	mg/l	1/1/2004	1/11/2007	41	41	100%	7.28	10.2	10
Nitrite (as N)	ug/l	1/1/2004	1/11/2007	41	0	0%	ND	ND	0.5
Nitrobenzene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
N-Nitrosodimethylamine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
N-Nitrosodi-n-propylamine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
N-Nitrosodiphenylamine	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.2
OctaCDD	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2.26
OctaCDF	pg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1.22
Oxamyl	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	20
PCB-1016	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1221	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1232	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1242	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1248	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1254	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
PCB-1260	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
Pentachlorophenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.05
pH	pH	1/1/2004	1/11/2007	41	41	100%	7.84	8.1	
Phenanthrene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Phenol	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Phosphorous, Total (as P)	mg/l	3/10/2004	1/11/2007	17	17	100%	2.89	4.6	0.5
Picloram	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
Pyrene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Selenium	ug/l	3/10/2004	1/11/2007	11	11	100%	1.54	6.56	0.1
Silver	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.1
Simazine (Princep)	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
Specific conductance (EC)	umohs/cm	1/1/2004	1/11/2007	41	41	100%	1098	1318	
Styrene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Sulfate	mg/l	3/10/2004	1/11/2007	11	10	91%	44.4	49.14	5
Sulfide (as S)	mg/l	3/10/2004	1/11/2007	11	1	9%	0.0700	0.27	0.5
Sulfite (as SO3)	mg/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	5
Temperature	C	1/1/2004	1/11/2007	40	40	100%	22.0	26.7	
Tetrachloroethene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Thallium	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Thiobencarb	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1

APPENDIX III

UC Davis Wastewater Treatment Plant Effluent Quality Summary

Name of Constituent	Units	Begin Date	End Date	Number of Samples	Number of Samples Detected	Percent Detected	AVE	MAX	Reporting Limit
Toluene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Total Dissolved Solids (TDS)	mg/l	1/1/2004	1/11/2007	40	40	100%	638	848	
Toxaphene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.01
trans-1,2-Dichloroethylene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	1
Tribuyltin	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.001
Trichloroethene	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	2
Trichlorofluoromethane	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	5
Vinyl chloride	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Xylenes	ug/l	3/10/2004	1/11/2007	11	0	0%	ND	ND	0.5
Zinc	ug/l	3/10/2004	1/11/2007	11	11	100%	49.8	57.9	0.5

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	RL (ug/L)
1,1-Dichlororethene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,1,1-Trichloroethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,1,2-Trichloroethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,1,2,2-Tetrachloroethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,2-Dichlorobenzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,2-Dichloroethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
cis-1,2-Dichloroethene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,2-Dichloropropane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,2,4-Trichlorobenzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,3-Dichlorobenzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,3-Dichloropropene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
1,4-Dichlorobenzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Acrolein	ug/L	12	0	0.00%	2.5	2.5	2.5	5
Acrylonitrile	ug/L	12	0	0.00%	1	1	1	2
Benzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Bromoform	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Bromomethane	ug/L	12	0	0.00%	0.5	0.5	0.5	1
Carbon Tetrachloride	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Chlorobenzene (mono chlorobenzene)	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Chloroethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
2- Chloroethyl vinyl ether	ug/L	11	0	0.00%	0.5	0.5	0.5	1
Chloroform	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Chloromethane	ug/L	11	0	0.00%	0.25	0.25	0.25	0.5
Dibromochloromethene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Dichlorobromomethane	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Dichloromethane (methylene chloride)	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Ethylbenzene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Hexachlorobutadiene	ug/L	12	0	0.00%	0.5	0.5	0.5	0.05
Naphthalene	ug/L	12	0	0.00%	5	5	5	0.0025
Tetrachloroethene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Toluene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
trans-1,2-Dichloroethylene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Trichloroethene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Vinyl chloride	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	MDL (ug/L)
MTBE	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Trichlorofluoromethane	ug/L	12	0	0.00%	2.5	2.5	2.5	0.5
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/L	12	0	0.00%	5	5	5	0.5
Styrene	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Xylenes	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Hexachlorobenzene	ug/L	4	0	0.00%	0.25	0.3125	0.5	0.001
Hexachloroethane	ug/L	4	0	0.00%	0.25	0.3125	0.5	0.05
1,2-Benzanthracene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
1,2-Diphenylhydrazine	ug/L	4	0	0.00%	0.1	0.1	0.1	0.2
2-Chlorophenol	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
2,4-Dichlorophenol	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
2,4-Dimethylphenol	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
2,4-Dinitrophenol	ug/L	4	0	0.00%	0.1	0.1	0.1	0.2
2,4-Dinitrotoluene	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
2,4,6-Trichlorophenol	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
2,6-Dinitrotoluene	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
2-Nitrophenol	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
2-Chloronaphthalene	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
3,3'-Dichlorobenzidine	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
3,4-Benzofluoranthene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
4-Chloro-3-methylphenol	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
4,6-Dinitro-2-methylphenol	ug/L	4	0	0.00%	0.25	0.25	0.25	0.5
4-Nitrophenol	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
4-Bromophenyl phenyl ether	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
4-Chlorophenyl phenyl ether	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
Acenaphthene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Acenaphthylene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Anthracene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Benzidine	ug/L	4	0	0.00%	0.1	0.1	0.1	0.2
Benzo(a)pyrene (3,4-Benzopyrene)	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Benzo(g,h,l)perylene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Benzo(k)fluoranthene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Bis(2-chloroethoxy)methane	ug/L	4	0	0.00%	0.1	0.1	0.1	0.2
Bis(2-chloroethyl)ether	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	MDL (ug/L)
Bis(2-chloroisopropyl)ether	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
Bis(2-ethylhexyl)phthalate	ug/L	4	4	100.00%	0.024	16.535	66	0.01
Butyl benzyl phthalate	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Chrysene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Di-n-butylphthalate	ug/L	4	3	75.00%	0.005	1.795	7.1	0.01
Di-n-octylphthalate	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Dibenzo(a,h)-anthracene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Diethyl phthalate	ug/L	4	3	75.00%	0.005	1.19675	4.7	0.01
Dimethyl phthalate	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Fluoranthene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Fluorene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Hexachlorocyclopentadiene	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
Indeno(1,2,3-c,d)pyrene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Isophorone	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
N-Nitrosodiphenylamine	ug/L	4	0	0.00%	0.1	0.1	0.1	0.2
N-Nitrosodimethylamine	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
N-Nitrosodi-n-propylamine	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
Nitrobenzene	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
Pentachlorophenol	ug/L	4	0	0.00%	0.025	0.025	0.025	0.05
Phenanthrene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Phenol	ug/L	4	0	0.00%	0.05	0.05	0.05	0.1
Pyrene	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Aluminum	ug/L	12	12	100.00%	34.3	157.9958	526	5
Antimony	ug/L	12	1	8.33%	0.25	0.284167	0.66	0.5
Arsenic	ug/L	12	12	100.00%	0.76	1.70625	2.735	0.01
Asbestos	MFL / >10 um	12	0	0.00%	0.0105	0.0105	0.0105	0.021 MFL / >10 ur
Barium	ug/L	12	12	100.00%	75.05	104.4	126	0.5
Beryllium	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Cadmium	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Chromium	ug/L	12	12	100.00%	1.03	4.769583	14.1	0.5
Chromium VI	ug/L	12	1	8.33%	0.005	0.687917	8	0.05
Copper	ug/L	12	12	100.00%	0.83	1.894167	5.95	0.5
Cyanide	ug/L	12	0	0.00%	5	5.141667	6.7	10
Fluoride	ug/L	12	10	83.33%	0.005	0.201667	0.39	0.01

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	MDL (ug/L)
Iron	ug/L	12	12	100.00%	79.4	266.125	988	5
Lead	ug/L	12	2	16.67%	0.25	0.438333	2.1	0.5
Mercury	ug/L	11	12	109.09%	0.000441	0.007274	0.0302	0.0002
Manganese	ug/L	12	12	100.00%	4.9	19.0625	83.7	0.5
Nickel	ug/L	12	12	100.00%	1.44	2.9475	9.26	0.5
Selenium	ug/L	12	12	100.00%	0.25	0.439167	0.85	0.5
Silver	ug/L	12	0	0.00%	0.05	0.05	0.05	0.1
Thallium	ug/L	12	0	0.00%	0.25	0.25	0.25	0.5
Tribuyltin	ug/L	12	2	16.67%	0.00005	0.001448	0.00977	0.0001
Zinc	ug/L	12	11	91.67%	0.25	3.79	22	0.5
4,4'-DDD	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
4,4'-DDE	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
4,4'-DDT	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
alpha-Endosulfan	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
alpha-Hexachlorocyclohexane (BHC)	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Alachlor	ug/L	4	0	0.00%	0.5	0.5	0.5	1
Aldrin	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
beta-Endosulfan	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
beta-Hexachlorocyclohexane	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Chlordane	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
delta-Hexachlorocyclohexane	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Dieldrin	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Endosulfan sulfate	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Endrin	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Endrin Aldehyde	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Heptachlor	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Heptachlor Epoxide	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Lindane (gamma-Hexachlorocyclohexane)	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
PCB-1016	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
PCB-1221	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
PCB-1232	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
PCB-1242	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
PCB-1248	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	MDL (ug/L)
PCB-1254	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
PCB-1260	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Toxaphene	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Atrazine	ug/L	4	0	0.00%	0.4	0.4	0.4	0.8
Bentazon	ug/L	4	0	0.00%	0.42	0.42	0.42	0.84
Carbfuran	ug/L	4	0	0.00%	0.65	0.65	0.65	1.3
2,4-D	ug/L	4	0	0.00%	2.65	2.65	2.65	5.3
Dalapon	ug/L	4	0	0.00%	0.8	0.8	0.8	1.6
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Di(2-ethylhexyl)adipate	ug/L	4	0	0.00%	0.255	0.255	0.255	0.51
Dinoseb	ug/L	4	0	0.00%	0.245	0.245	0.245	0.49
Diquat	ug/L	4	0	0.00%	2	2	2	4
Endothal	ug/L	4	0	0.00%	22.5	22.5	22.5	45
Ethylene Dibromide	ug/L	4	0	0.00%	0.01	0.01	0.01	0.02
Glyphosate	ug/L	4	0	0.00%	12.5	12.5	12.5	25
Methoxychlor	ug/L	4	0	0.00%	0.0005	0.0005	0.0005	0.001
Molinate (Ordram)	ug/L	4	0	0.00%	0.14	0.14	0.14	0.28
Oxamyl	ug/L	4	0	0.00%	1.3	1.3	1.3	2.6
Picloram	ug/L	4	0	0.00%	0.135	0.135	0.135	0.27
Simazine (Princep)	ug/L	4	0	0.00%	0.49	0.49	0.49	0.98
Thiobencarb	ug/L	4	0	0.00%	0.225	0.225	0.225	0.45
2,4,5-TP (Silvex)	ug/L	4	0	0.00%	0.21	0.21	0.21	0.42
Diazinon	ug/L	4	0	0.00%	0.125	0.125	0.125	0.25
Diazinon	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Chlorpyifos	ug/L	4	0	0.00%	0.005	0.005	0.005	0.01
Ammonia (as N)	mg/L	12	12	100.00%	0.05	1.010833	10.82	0.1 ppm
Chloride	mg/L	12	12	100.00%	11	19.7	35	10 ppm
Specific conductance (EC)	uhoms/cm	see EC data summary						
Turbidity, NTU	NTU	9	14.6	1680.00%	0		1.1	
Hardness (as CaCO3)	mg/L	240	260	16000.00%	148	244.1667	180	1
Foaming Agents (MBAS)	mg/L	12	12	100.00%	0.01	0.029917	0.052	0.005
Nitrate (as N)	mg/L	12	12	100.00%	0.96	6.305455	22.6	23
Nitrite (as N)	mg/L	12	0	0.00%	0.053	12.50983	15	30

APPENDIX IV

South Fork Putah Creek Water Quality Summary for the Upstream (R1) Monitoring (January to December, 2002)

Constituent	Units	Number of samples	Number of samples Detected	Percentage Detected	MIN	AVE	MAX	MDL (ug/L)
pH	SU	12	12	100.00%	7.79	8.251667	8.61	-
Phosphorous, Total (as P)	mg/L	12	4	33.33%	0.011	0.033364	0.14	.050 ppm
Sulfate	mg/L	12	12	100.00%	18	31.5	44	1.0 ppm
Sulfide (as S)	mg/L	12	1	8.33%	0.5	0.529167	0.85	1.0 ppm
Sulfite (as SO3)	mg/L	12	0	0.00%	0.025	0.025	0.025	5.0 ppm
Temperature	°c	-	-	-	-	-	-	-
Total Dissolved Solids (TDS)	mg/L	12	12	100.00%	246	302.5833	384	1
2,3,7,8TetraCDD	ng/L	2	0	0.00%	0.025	0.025	0.025	0.0095
1,2,3,7,8-PentaCDD	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,4,7,8-HexaCDD	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,6,7,8-HexaCDD	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,7,8,9-HexaCDD	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,4,6,7,8-HeptaCDD	ng/L	2	1	50.00%	0.025	6.3125	12.6	0.048
OctaCDD	ng/L	2	1	50.00%	0.025	27.9625	55.9	0.048
2,3,7,8-TetraCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.0095
1,2,3,7,8-PentaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
2,3,4,7,8-PentaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,4,7,8-HexaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,6,7,8-HexaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,7,8,9-HexaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
2,3,4,6,7,8-HexaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,4,6,7,8-HeptaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
1,2,3,4,7,8,9-HeptaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.048
OctaCDF	ng/L	2	0	0.00%	0.025	0.025	0.025	0.095

Appendix V. UC Davis WWTP Outfall EC Monitoring

Date	R-1, µmhos/cm	R-2, µmhos/cm	Date	R-1, µmhos/cm	R-2, µmhos/cm
1/12/2001	424	491	1/7/2002	323	360
1/16/2001	470	491	1/14/2002	602	651
1/24/2001	560	614	1/22/2002	489	497
2/1/2001	570	620	1/29/2002	630	665
2/6/2001	630	685	2/4/2002	363	809
2/13/2001	252	301	2/11/2002	653	770
2/22/2001	293	352	2/21/2002	715	780
2/28/2001	490	525	2/25/2002	720	785
3/5/2001	270	290	3/4/2002	720	785
3/13/2001	665	695	3/11/2002	611	713
3/21/2001	735	785	3/19/2002	605	646
3/29/2001	640	645	3/25/2002	570	595
4/6/2001	562	604	4/1/2002	431	485
4/9/2001	501	526	4/9/2002	487	543
4/17/2001	505	530	4/16/2002	519	556
4/26/2001	515	539	4/22/2002	517	533
5/1/2001	514	538	4/30/2002	484	540
5/7/2001	490	508	5/6/2002	511	545
5/18/2001	449	498	5/13/2002	526	584
5/25/2001	520	602	5/21/2002	482	569
5/29/2001	530	564	5/29/2002	515	583
6/5/2001	506	621	6/5/2002	504	549
6/15/2001	514	594	6/11/2002	484	558
6/21/2001	495	678	6/19/2002	484	546
6/26/2001	509	596	6/25/2002	498	558
7/5/2001	520	507	7/2/2002	473	712
7/10/2001	460	495	7/8/2002	466	689
7/17/2001	469	523	7/16/2002	463	586
7/30/2001	494	568	7/23/2002	445	574
8/6/2001	449	554	8/1/2002	443	540
8/14/2001	434	452	8/5/2002	472	553
8/20/2001	474	549	8/12/2002	476	554
8/29/2001	532	687	8/19/2002	437	513
9/4/2001	465	592	8/26/2002	478	574
9/10/2001	549	604	9/5/2002	466	648
9/18/2001	497	693	9/9/2002	519	659
9/25/2001	555	671	9/16/2002	537	650
10/2/2001	564	709	9/24/2002	511	596
10/9/2001	665	700	10/3/2002	583	717
10/18/2001	698	797	10/7/2002	670	792
10/23/2001	611	717	10/14/2002	607	754
11/1/2001	648	727	10/21/2002	602	761
11/5/2001	529	696	10/28/2002	559	676
11/14/2001	500	654	11/04/02	583	792
11/19/2001	519	603	11/14/02	377	400
11/29/2001	362	459	11/22/02	430	547
12/4/2001	291	326	11/25/02	465	559
12/11/2001	572	527	12/03/02	508	762
12/18/2001	520	571	12/12/02	517	653
12/27/2001	514	562	12/17/02	190	218

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

1/3/2002	234	251	12/23/02	336	358
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
01/02/03	393	435	1/13/2004	553	746
01/06/03	591	398	1/20/2004	539	513
01/13/03	471	510	1/29/2004	499	658
01/24/03	628	745	2/5/2004	395	531
02/03/03	623	797	2/10/2004	541	526
02/10/03	733	784	2/19/2004	316	312
02/18/03	382	438	2/27/2004	318	320
02/24/03	334	346	3/2/2004	322	327
03/03/03	613	785	3/9/2004	330	431
03/10/03	601	628	3/15/2004	340	391
03/19/03	324	148	3/22/2004	342	364
03/28/03	348	377	3/29/2004	348	390
04/07/03	360	414	3/30/2004	325	393
04/14/03	348	344	3/31/2004	326	371
04/22/03	350	405	1-Apr-04	341	389
05/02/03	317	320	2-Apr-04	332	364
05/07/03	319	324	5-Apr-04	404	449
05/16/03	346	369	6-Apr-04	407	426
05/23/03	528	565	7-Apr-04	459	489
05/30/03	527	572	8-Apr-04	490	521
06/02/03	506	519	9-Apr-04	503	514
06/13/03	515	568	12-Apr-04	505	643
06/17/03	529	576	13-Apr-04	508	533
06/27/03	513	597	14-Apr-04	486	541
07/02/03	498	561	15-Apr-04	476	549
07/09/03	479	577	16-Apr-04	488	559
07/17/03	439	573	19-Apr-04	475	565
07/24/03	430	547	20-Apr-04	487	566
07/30/03	437	488	21-Apr-04	486	573
08/05/03	441	550	22-Apr-04	490	506
08/12/03	437	548	23-Apr-04	502	525
08/19/03	439	384	26-Apr-04	508	508
08/26/03	466	577	27-Apr-04	505	544
09/03/03	433	534	28-Apr-04	495	503
09/09/03	554	738	29-Apr-04	498	543
09/16/03	463	597	30-Apr-04	509	535
09/23/03	523	737	3-May-04	495	548
10/02/03	494	632	4-May-04	496	566
10/09/03	503	640	5-May-04	499	547
10/17/03	523	558	6-May-04	505	547
10/24/03	524	684	7-May-04	490	556
10/30/03	528	661	10-May-04	503	583
11/07/03	522	605	11-May-04	501	610
11/13/03	513	701	12-May-04	508	555
11/21/03	516	730	13-May-04	500	591
11/25/03	530	738	14-May-04	497	546
12/3/2003	376	407	17-May-04	512	552
12/12/2003	485	566	18-May-04	512	600
12/16/2003	492	824	19-May-04	523	590

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

12/22/2003	471	566	20-May-04	501	541
12/30/2003	180	215	21-May-04	507	547
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
1/6/2004	439	488	24-May-04	507	629
25-May-04	521	597	9-Aug-04	432	671
26-May-04	501	533	10-Aug-04	434	554
27-May-04	483	542	11-Aug-04	417	586
28-May-04	475	562	12-Aug-04	440	542
1-Jun-04	490	581	13-Aug-04	421	702
2-Jun-04	474	530	16-Aug-04	449	545
3-Jun-04	477	554	17-Aug-04	427	586
4-Jun-04	484	580	18-Aug-04	403	547
7-Jun-04	480	514	19-Aug-04	401	553
8-Jun-04	464	576	20-Aug-04	433	603
9-Jun-04	439	546	23-Aug-04	440	572
10-Jun-04	443	471	24-Aug-04	435	566
11-Jun-04	487	587	25-Aug-04	431	552
14-Jun-04	476	542	26-Aug-04	430	503
15-Jun-04	486	505	27-Aug-04	433	544
16-Jun-04	496	509	30-Aug-04	444	596
17-Jun-04	483	582	31-Aug-04	432	590
18-Jun-04	481	485	1-Sep-04	425	586
21-Jun-04	460	473	2-Sep-04	415	534
22-Jun-04	510	660	3-Sep-04	409	479
23-Jun-04	456	565	7-Sep-04	507	656
24-Jun-04	443	531	8-Sep-04	538	667
25-Jun-04	441	529	9-Sep-04	511	711
28-Jun-04	454	515	10-Sep-04	532	733
29-Jun-04	449	558	13-Sep-04	571	703
30-Jun-04	469	600	14-Sep-04	524	648
1-Jul-04	462	524	15-Sep-04	548	743
2-Jul-04	463	541	16-Sep-04	554	674
6-Jul-04	444	522	17-Sep-04	559	680
7-Jul-04	446	520	20-Sep-04	502	634
8-Jul-04	422	551	21-Sep-04	542	666
9-Jul-04	421	478	22-Sep-04	625	676
12-Jul-04	418	507	23-Sep-04	588	667
13-Jul-04	425	617	24-Sep-04	514	593
14-Jul-04	423	579	27-Sep-04	566	702
15-Jul-04	422	495	28-Sep-04	590	705
16-Jul-04	440	576	29-Sep-04	587	727
19-Jul-04	442	565	30-Sep-04	593	698
20-Jul-04	414	447	1-Oct-04	564	710
21-Jul-04	402	508	4-Oct-04	601	707
22-Jul-04	414	606	5-Oct-04	632	696
23-Jul-04	409	448	6-Oct-04	587	669
26-Jul-04	467	590	7-Oct-04	551	700
27-Jul-04	430	553	8-Oct-04	585	673
28-Jul-04	430	609	11-Oct-04	584	702
29-Jul-04	420	595	12-Oct-04	593	718
30-Jul-04	438	604	13-Oct-04	575	697

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

2-Aug-04	398	524	14-Oct-04	545	718
3-Aug-04	401	593	15-Oct-04	581	713
4-Aug-04	424	622	18-Oct-04	561	733
Date	**R-1,** µmhos/cm	**R-2,** µmhos/cm	**Date**	**R-1,** µmhos/cm	**R-2,** µmhos/cm
5-Aug-04	426	427	19-Oct-04	573	675
6-Aug-04	422	577	20-Oct-04	488	575
21-Oct-04	354	407	12-Jan-05	277	385
22-Oct-04	373	693	13-Jan-05	332	452
25-Oct-04	460	519	14-Jan-05	464	521
26-Oct-04	364	413	18-Jan-05	518	651
27-Oct-04	355	393	19-Jan-05	548	631
28-Oct-04	372	522	20-Jan-05	623	681
29-Oct-04	387	639	21-Jan-05	601	681
1-Nov-04	494	679	24-Jan-05	574	727
2-Nov-04	492	723	25-Jan-05	585	667
3-Nov-04	682	495	26-Jan-05	580	663
4-Nov-04	477	695	27-Jan-05	559	646
5-Nov-04	503	546	28-Jan-05	541	438
8-Nov-04	513	719	31-Jan-05	387	486
9-Nov-04	474	656	1-Feb-05	476	579
10-Nov-04	470	552	2-Feb-05	531	624
12-Nov-04	455	497	3-Feb-05	572	641
15-Nov-04	355	418	4-Feb-05	630	710
16-Nov-04	376	425	7-Feb-05	650	752
17-Nov-04	363	442	8-Feb-05	633	701
18-Nov-04	416	579	9-Feb-05	622	783
19-Nov-04	438	557	10-Feb-05	649	777
22-Nov-04	478	529	11-Feb-05	641	981
23-Nov-04	415	638	14-Feb-05	632	777
24-Nov-04	439	505	15-Feb-05	618	811
29-Nov-04	460	493	16-Feb-05	541	540
30-Nov-04	446	593	17-Feb-05	350	412
1-Dec-04	410	508	18-Feb-05	346	425
2-Dec-04	398	454	22-Feb-05	284	321
3-Dec-04	435	483	23-Feb-05	310	374
6-Dec-04	422	498	24-Feb-05	389	476
7-Dec-04	359	462	25-Feb-05	501	571
8-Dec-04	403	541	28-Feb-05	618	673
9-Dec-04	345	416	1-Mar-05	447	511
10-Dec-04	290	360	2-Mar-05	458	491
13-Dec-04	422	477	3-Mar-05	547	595
14-Dec-04	441	486	4-Mar-05	610	630
15-Dec-04	450	502	7-Mar-05	620	676
16-Dec-04	484	531	8-Mar-05	635	695
17-Dec-04	443	511	9-Mar-05	640	692
20-Dec-04	485	573	10-Mar-05	636	679
21-Dec-04	520	554	11-Mar-05	680	700
22-Dec-04	483	560	14-Mar-05	670	687
23-Dec-04	517	535	15-Mar-05	664	713
28-Dec-04	418	532	16-Mar-05	632	683
30-Dec-04	275	375	17-Mar-05	664	707

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

3-Jan-05	182	451	18-Mar-05	640	676
4-Jan-05	247	374	21-Mar-05	377	433
5-Jan-05	277	407	22-Mar-05	261	773
6-Jan-05	358	437	23-Mar-05	300	319
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
7-Jan-05	293	762	24-Mar-05	347	749
10-Jan-05	351	435	28-Mar-05	632	644
11-Jan-05	356	492	29-Mar-05	327	696
30-Mar-05	314	880	13-Jun-05	473	566
31-Mar-05	333	587	14-Jun-05	480	575
1-Apr-05	339	565	15-Jun-05	479	577
4-Apr-05	322	438	16-Jun-05	483	607
5-Apr-05	334	451	17-Jun-05	472	533
6-Apr-05	324	355	20-Jun-05	460	564
7-Apr-05	322	523	21-Jun-05	474	553
8-Apr-05	341	417	22-Jun-05	475	607
11-Apr-05	324	382	23-Jun-05	569	549
12-Apr-05	321	364	24-Jun-05	477	562
13-Apr-05	338	409	27-Jun-05	461	719
14-Apr-05	320	356	28-Jun-05	448	580
15-Apr-05	363	396	29-Jun-05	464	560
18-Apr-05	356	410	30-Jun-05	485	574
19-Apr-05	376	410	1-Jul-05	462	613
20-Apr-05	356	401	5-Jul-05	465	608
21-Apr-05	430	494	6-Jul-05	448	591
22-Apr-05	411	461	7-Jul-05	619	458
25-Apr-05	536	590	8-Jul-05	444	581
26-Apr-05	541	586	11-Jul-05	441	639
27-Apr-05	543	593	12-Jul-05	412	700
28-Apr-05	534	590	13-Jul-05	432	658
29-Apr-05	536	562	14-Jul-05	454	758
2-May-05	541	596	15-Jul-05	437	494
3-May-05	540	613	18-Jul-05	443	748
4-May-05	542	600	19-Jul-05	441	682
5-May-05	522	596	20-Jul-05	439	679
6-May-05	541	598	21-Jul-05	445	684
9-May-05	524	600	22-Jul-05	437	629
10-May-05	480	550	25-Jul-05	418	648
11-May-05	472	528	26-Jul-05	428	557
12-May-05	514	558	27-Jul-05	436	624
13-May-05	531	595	28-Jul-05	420	675
16-May-05	528	623	29-Jul-05	426	559
17-May-05	544	603	1-Aug-05	418	575
18-May-05	547	627	2-Aug-05	417	600
19-May-05	530	608	3-Aug-05	404	482
20-May-05	352	394	4-Aug-05	439	781
23-May-05	363	404	5-Aug-05	443	629
24-May-05	365	408	8-Aug-05	473	782
25-May-05	367	419	9-Aug-05	452	705
26-May-05	375	426	10-Aug-05	443	712
27-May-05	370	409	11-Aug-05	462	716

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

31-May-05	490	562	12-Aug-05	477	703
1-Jun-05	508	609	15-Aug-05	449	704
2-Jun-05	494	571	16-Aug-05	485	712
3-Jun-05	496	621	17-Aug-05	457	795
6-Jun-05	483	541	18-Aug-05	480	776
Date	**R-1, μmhos/cm**	**R-2, μmhos/cm**	**Date**	**R-1, μmhos/cm**	**R-2, μmhos/cm**
7-Jun-05	467	547	19-Aug-05	456	653
8-Jun-05	456	571	22-Aug-05	470	693
9-Jun-05	483	581	23-Aug-05	462	606
10-Jun-05	496	579	24-Aug-05	475	627
25-Aug-05	511	634	8-Nov-05	534	551
26-Aug-05	487	601	9-Nov-05	511	614
29-Aug-05	458	504	10-Nov-05	491	664
30-Aug-05	437	515	14-Nov-05	525	726
31-Aug-05	449	608	15-Nov-05	510	655
1-Sep-05	439	446	16-Nov-05	527	556
2-Sep-05	422	555	17-Nov-05	392	435
6-Sep-05	588	754	18-Nov-05	376	427
7-Sep-05	575	715	21-Nov-05	361	436
8-Sep-05	550	698	23-Nov-05	465	476
9-Sep-05	566	716	28-Nov-05	512	626
12-Sep-05	588	686	29-Nov-05	490	611
13-Sep-05	554	676	30-Nov-05	484	587
14-Sep-05	522	680	2-Dec-05	503	635
15-Sep-05	567	729	5-Dec-05	494	660
16-Sep-05	594	738	6-Dec-05	503	597
19-Sep-05	627	749	7-Dec-05	543	632
20-Sep-05	579	738	8-Dec-05	506	576
21-Sep-05	541	668	9-Dec-05	529	624
22-Sep-05	606	749	12-Dec-05	543	684
23-Sep-05	656	761	13-Dec-05	542	748
26-Sep-05	523	683	14-Dec-05	512	724
27-Sep-05	546	647	15-Dec-05	500	635
28-Sep-05	529	602	16-Dec-05	524	644
29-Sep-05	521	650	19-Dec-05	368	444
30-Sep-05	525	685	20-Dec-05	296	382
3-Oct-05	552	827	28-Dec-05	413	512
4-Oct-05	612	703	2-Jan-06	197	274
5-Oct-05	643	721	3-Jan-06	293	317
6-Oct-05	591	724	4-Jan-06	314	324
7-Oct-05	545	654	5-Jan-06	304	321
10-Oct-05	542	663	6-Jan-06	300	341
11-Oct-05	564	699	9-Jan-06	311	326
12-Oct-05	549	605	10-Jan-06	317	333
13-Oct-05	533	640	11-Jan-06	312	336
14-Oct-05	574	685	12-Jan-06	311	330
17-Oct-05	604	765	13-Jan-06	331	408
18-Oct-05	613	696	17-Jan-06	311	672
19-Oct-05	569	673	18-Jan-06	315	723
20-Oct-05	553	709	19-Jan-06	323	515
21-Oct-05	560	744	20-Jan-06	304	670

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

24-Oct-05	611	747	23-Jan-06	323	623
25-Oct-05	573	699	24-Jan-06	329	645
26-Oct-05	546	690	25-Jan-06	320	467
27-Oct-05	630	726	26-Jan-06	323	590
28-Oct-05	566	679	27-Jan-06	345	456
31-Oct-05	548	657	30-Jan-06	333	429
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
1-Nov-05	581	734	31-Jan-06	324	769
2-Nov-05	547	707	1-Feb-06	317	585
3-Nov-05	560	686	2-Feb-06	324	439
4-Nov-05	555	762	3-Feb-06	337	549
7-Nov-05	534	647	6-Feb-06	306	493
8-Nov-05	534	551	20-Apr-06	328	337
9-Nov-05	511	614	21-Apr-06	327	329
10-Nov-05	491	664	24-Apr-06	335	341
14-Nov-05	525	726	25-Apr-06	328	342
15-Nov-05	510	655	26-Apr-06	341	377
16-Nov-05	527	556	27-Apr-06	338	508
7-Feb-06	322	385	28-Apr-06	335	469
8-Feb-06	316	346	1-May-06	356	584
9-Feb-06	322	358	2-May-06	352	689
10-Feb-06	326	356	3-May-06	349	487
13-Feb-06	328	357	4-May-06	362	561
14-Feb-06	325	356	5-May-06	349	475
15-Feb-06	325	354	8-May-06	352	383
16-Feb-06	316	352	9-May-06	364	400
17-Feb-06	321	365	10-May-06	373	396
21-Feb-06	340	386	11-May-06	373	401
22-Feb-06	355	425	12-May-06	395	413
23-Feb-06	355	401	15-May-06	425	459
24-Feb-06	352	397	16-May-06	425	480
27-Feb-06	316	391	17-May-06	470	517
28-Feb-06	245	247	18-May-06	468	523
1-Mar-06	322	325	19-May-06	458	521
2-Mar-06	314	327	22-May-06	471	592
3-Mar-06	314	322	23-May-06	567	612
6-Mar-06	271	280	24-May-06	593	644
7-Mar-06	304	314	25-May-06	608	648
8-Mar-06	308	321	26-May-06	601	632
9-Mar-06	311	317	30-May-06	598	627
10-Mar-06	302	326	31-May-06	621	644
13-Mar-06	312	331	2-Jun-06	607	636
14-Mar-06	318	327	5-Jun-06	626	655
15-Mar-06	317	331	6-Jun-06	618	664
17-Mar-06	323	327	7-Jun-06	621	646
21-Mar-06	313	328	8-Jun-06	600	622
22-Mar-06	183	191	9-Jun-06	602	637
23-Mar-06	323	326	12-Jun-06	590	646
24-Mar-06	322	369	13-Jun-06	574	628
27-Mar-06	323	365	14-Jun-06	579	618
28-Mar-06	319	347	15-Jun-06	584	584

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

29-Mar-06	295	342	16-Jun-06	586	575
30-Mar-06	316	331	19-Jun-06	583	595
3-Apr-06	286	303	20-Jun-06	595	654
4-Apr-06	299	307	21-Jun-06	597	611
5-Apr-06	313	329	22-Jun-06	597	633
7-Apr-06	316	336	23-Jun-06	594	613
10-Apr-06	318	330	26-Jun-06	574	613
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
12-Apr-06	290	301	27-Jun-06	570	620
13-Apr-06	298	310	28-Jun-06	584	673
14-Apr-06	315	325	29-Jun-06	578	627
17-Apr-06	316	324	30-Jun-06	540	618
18-Apr-06	322	324	3-Jul-06	531	616
19-Apr-06	315	327	5-Jul-06	540	609
6-Jul-06	539	602	18-Dec-06	585	596
7-Jul-06	550	593	19-Dec-06	580	711
10-Jul-06	535	604	20-Dec-06	575	674
11-Jul-06	520	530	21-Dec-06	556	675
12-Jul-06	551	620	22-Dec-06	550	589
13-Jul-06	531	581	28-Dec-06	543	577
14-Jul-06	540	587	2-Jan-07	572	719
17-Jul-06	504	557	3-Jan-07	593	727
18-Jul-06	510	556	5-Jan-07	568	606
19-Jul-06	510	572	8-Jan-07	567	648
20-Jul-06	497	564	10-Jan-07	568	681
21-Jul-06	519	560	11-Jan-07	568	821
24-Jul-06	506	546	16-Jan-07	564	619
25-Jul-06	506	558	17-Jan-07	559	592
26-Jul-06	500	577	18-Jan-07	549	630
27-Jul-06	495	559	19-Jan-07	540	728
28-Jul-06	508	555	22-Jan-07	569	663
31-Jul-06	520	593	23-Jan-07	571	781
1-Aug-06	513	600	26-Jan-07	545	784
2-Aug-06	514	574	30-Jan-07	571	763
3-Aug-06	534	595	2-Feb-07	463	728
4-Aug-06	522	592	6-Feb-07	603	888
7-Aug-06	528	623	12-Feb-07	517	557
8-Aug-06	519	531	15-Feb-07	483	619
9-Aug-06	522	570	20-Feb-07	628	794
10-Aug-06	528	644	22-Feb-07	590	691
11-Aug-06	522	548	2-Mar-07	624	718
14-Aug-06	472	591	5-Mar-07	877	749
15-Aug-06	511	605	6-Mar-07	604	659
17-Aug-06	512	539	12-Mar-07	567	712
18-Aug-06	501	553	13-Mar-07	580	689
21-Aug-06	494	567	14-Mar-07	582	648
22-Aug-06	498	540	19-Mar-07	564	607
23-Aug-06	467	496	20-Mar-07	564	699
24-Aug-06	504	551	21-Mar-07	565	584
25-Aug-06	512	553	22-Mar-07	558	604
28-Aug-06	483	516	23-Mar-07	520	597

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

29-Aug-06	487	529	28-Mar-07	554	580
31-Aug-06	468	600	29-Mar-07	383	471
1-Sep-06	469	672	4-Apr-07	495	555
4-Sep-06	514	665	5-Apr-07	497	532
5-Sep-06	490	637	6-Apr-07	482	549
6-Sep-06	574	692	10-Apr-07	464	495
7-Sep-06	639	780	13-Apr-07	459	509
8-Sep-06	623	768	16-Apr-07	427	444
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
11-Sep-06	613	786	17-Apr-07	427	493
12-Sep-06	616	792	18-Apr-07	442	496
13-Sep-06	595	785	19-Apr-07	460	525
14-Sep-06	626	861	20-Apr-07	453	488
15-Sep-06	659	818	23-Apr-07	438	478
18-Sep-06	696	834	24-Apr-07	440	495
19-Sep-06	657	807	25-Apr-07	464	507
20-Sep-06	597	792	18-Dec-06	585	596
21-Sep-06	656	880	19-Dec-06	580	711
22-Sep-06	653	800	20-Dec-06	575	674
25-Sep-06	708	890	21-Dec-06	556	675
26-Sep-06	649	815	22-Dec-06	550	589
27-Sep-06	623	765	28-Dec-06	543	577
28-Sep-06	558	720	2-Jan-07	572	719
29-Sep-06	451	736	3-Jan-07	593	727
2-Oct-06	654	791	5-Jan-07	568	606
3-Oct-06	578	744	8-Jan-07	567	648
4-Oct-06	595	755	10-Jan-07	568	681
5-Oct-06	605	799	11-Jan-07	568	821
6-Oct-06	607	872	16-Jan-07	564	619
9-Oct-06	579	727	17-Jan-07	559	592
10-Oct-06	573	675	18-Jan-07	549	630
11-Oct-06	553	854	19-Jan-07	540	728
12-Oct-06	560	761	22-Jan-07	569	663
13-Oct-06	574	727	23-Jan-07	571	781
16-Oct-06	594	803	26-Jan-07	545	784
17-Oct-06	629	793	30-Jan-07	571	763
18-Oct-06	688	736	2-Feb-07	463	728
20-Oct-06	498	814	6-Feb-07	603	888
23-Oct-06	615	839	12-Feb-07	517	557
24-Oct-06	620	913	15-Feb-07	483	619
25-Oct-06	655	788	20-Feb-07	628	794
26-Oct-06	664	884	22-Feb-07	590	691
27-Oct-06	665	922	2-Mar-07	624	718
31-Oct-06	640	925	5-Mar-07	877	749
1-Nov-06	624	967	6-Mar-07	604	659
3-Nov-06	595	782	12-Mar-07	567	712
6-Nov-06	567	835	13-Mar-07	580	689
7-Nov-06	579	867	14-Mar-07	582	648
8-Nov-06	588	880	19-Mar-07	564	607
14-Nov-06	578	685	20-Mar-07	564	699
15-Nov-06	582	816	21-Mar-07	565	584

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.

Appendix V. UC Davis WWTP Outfall EC Monitoring

16-Nov-06	582	905	22-Mar-07	558	604
17-Nov-06	594	852	23-Mar-07	520	597
20-Nov-06	603	784	28-Mar-07	554	580
21-Nov-06	605	847	29-Mar-07	383	471
22-Nov-06	594	784	4-Apr-07	495	555
27-Nov-06	603	656	5-Apr-07	497	532
29-Nov-06	591	616	6-Apr-07	482	549
30-Nov-06	591	660	10-Apr-07	464	495
1-Dec-06	375	401	13-Apr-07	459	509
Date	**R-1, µmhos/cm**	**R-2, µmhos/cm**	**Date**	**R-1, µmhos/cm**	**R-2, µmhos/cm**
4-Dec-06	385	447	16-Apr-07	427	444
5-Dec-06	387	448	17-Apr-07	427	493
6-Dec-06	420	686	18-Apr-07	442	496
7-Dec-06	463	696	19-Apr-07	460	525
8-Dec-06	520	778	20-Apr-07	453	488
11-Dec-06	529	685	23-Apr-07	438	478
13-Dec-06	534	691	24-Apr-07	440	495
15-Dec-06	554	720	25-Apr-07	464	507
26-Apr-07	448	478			
27-Apr-07	451	506			
30-Apr-07	466	524			

Summary o	R1	R2
AVG	475	571
MIN	180	148
MAX	735	967

Occurrences of EC exceeds 900 µmhos/cm at R2: 6 out of 879 samples

Note: R1 is located upstream of WWTP discharge.
R2 is downstream of WWTP discharge.